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THE BRITISH JOURNAL

PHOTOGRAPHIC ALMANAC,

AND

Photographer's Daily Companion,

FOR

1885.

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PREFACE.

In writing the last few lines for the Almanac for 1885—the last lines written, though they may take a foremost place in appearance—we can only repeat what was said last year, that if no great and sudden advance has been made at least we have not had a year of inaction.

Plenty of good, solid work has been done, both by the societies and in our Journal, and the present volume contains, we venture to think, the condensed results of the year's work, chiefly contributed by many friends, to whom the Editor's warmest thanks are freely given for their kind assistance.

Messrs. Wratten and Wainwright are to be congratulated upon the quality of the picture taken upon their plate—the joint work of Mr. Vanderweyde and MM. Goupil et Cie., of Paris—which forms our frontispiece. The portrait of the charming actress who so well fills the present gap at the Lyceum Theatre will, we are sure, be appreciated by our subscribers, and we think no more appropriate subject at the present time nor any better model could have been selected.

W. B. Bolton,
Editor.

2, York Street, Covent Garden, W.C.,
December 10, 1884.

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JANUARY.

D M	D W	Meetings of Societies, &c.	Sun Rises H. M.	Sun Sets H. M.	Moon Rises After	Moon Sets Morn.
1	Th	*S. Lon., Lon. and Prov., Glas., Bol.,*	8 8	4 0	5 2	7 39
2	Fr	*[Dund., Leeds, Coven., Brad.*	8 8	4 1	6 19	8 29
3	Sa	Arabi made War Secretary, 1882	8 8	4 2	7 36	9 10
4	S	**2 Sun. after Christmas**	8 8	4 3	8 50	9 43
5	M	*W. R. of York., Notts, B'burn.*	8 8	4 4	10 5	10 13
6	Tu	*Sheff., Halif., Bol. C., Glos., Bur.*	8 7	4 6	11 15	10 41
7	W	*Pho. C., P. Ben., Edn., N. Staf., Der.*	8 7	4 7	Morn	11 6
8	Th	*Lon. and Prov., M'chester, B'head*	8 7	4 8	0 23	11 30
9	Fr	*Ireland*	8 6	4 9	1 27	11 56
10	Sa	Surr. of Carthagena, 1874	8 6	4 10	2 33	After
11	S	**1 Sun. after Epiphany**	8 5	4 11	3 33	0 58
12	M	*B'burn [Bol. C., Glas. Am.*	8 4	4 13	4 30	1 35
13	Tu	*Gt. Brit., N'castle-on-T. (An. M.),*	8 3	4 14	5 24	2 17
14	W	*Cheltenham Am., Bury, Photo. C.*	8 2	4 16	6 13	3 6
15	Th	*Lon. and Prov.*	8 2	4 18	6 56	3 59
16	Fr	*Edin. Photo. Club*	8 1	4 19	7 34	4 57
17	Sa	Battle of Falkirk, 1756	8 0	4 21	8 7	5 59
18	S	**2 Sun. after Epiphany**	7 59	4 22	8 37	7 4
19	M	*B'burn.* Oxford Lent Term begins	7 58	4 24	9 4	8 10
20	Tu	*Bol. C.*	7 57	4 26	9 28	9 17
21	W	*Photo. C., St. Helens*	7 56	4 27	9 53	10 26
22	Th	*Lon. and Prov.*	7 55	4 29	10 19	11 37
23	Fr	W. Pitt died, 1806	7 54	4 31	10 47	Morn
24	Sa	Adam Black (publisher) d., 1874	7 53	4 33	11 18	0 49
25	S	**3 Sun. after Epiphany**	7 51	4 35	11 54	2 2
26	M	*B'burn.* Dr. Jenner died, 1823	7 50	4 37	After	3 13
27	Tu	*Bol. C.*	7 48	4 39	1 34	4 20
28	W	*Bristol and W. of Eng. Am., Photo. C.*	7 47	4 40	2 37	5 22
29	Th	*Lon. and Prov., L'pool Am., Oldham*	7 45	4 41	3 49	6 15
30	Fr	*[Yorks. Col.*	7 44	4 43	5 6	6 59
31	Sa	Hilary Law Term ends	7 43	4 45	6 22	7 38

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FEBRUARY.

D M	D W	Meetings of Societies, &c.	Sun Rises. H. M	Sun Sets. H. M.	Moon Rises. After.	Moon Sets. Morn.
1	S	**Septuagesima**	7 41	4 47	7 38	8 12
2	M	*W. R. of York., Notts, B'burn*	7 40	4 49	8 52	8 40
3	Tu	*Sheff., Halif., Bol. C., Glos., Bur.*	7 38	4 50	10 3	9 6
4	W	*Pho. C., P. Ben., Edn., N. Staf., Der.*	7 36	4 52	11 13	9 33
5	Th	*S. Lon., Lon. and Prov., Glas., Bol.,*	7 34	4 54	Morn	9 59
6	Fr	[*Dund., Leeds, Coven., Brad.*	7 32	4 56	0 19	10 27
7	Sa	Charles Dickens born, 1812	7 30	4 58	1 21	10 59
8	S	**Sexagesima**	7 29	5 0	2 20	11 35
9	M	*B'burn* [*Bol. C., N'castle-on-T.*	7 27	5 2	3 16	After
10	Tu	*Gt. Brit. (Ann. Meet.), Glasg. Am.,*	7 26	5 4	4 7	1 1
11	W	*Cheltenham Am., Bury, Photo. C.*	7 24	5 5	4 52	1 53
12	Th	*Lon. and Prov., M'chester, B'head*	7 22	5 7	5 31	2 48
13	Fr	*Ireland.*	7 20	5 9	6 8	3 49
14	Sa	St. Valentine	7 18	5 11	6 39	4 52
15	S	**Quinquagesima.** Shrove Sunday	7 16	5 13	7 8	6 0
16	M	*B'burn.* J. Gurney Hoare d., 1875	7 14	5 14	7 73	7 7
17	Tu	*Bol. C.*	7 12	5 16	7 59	8 17
18	W	*Photo. C., St. Helens*	7 10	5 18	8 25	9 27
19	Th	*Lon. and Prov.*	7 8	5 20	8 51	10 39
20	Fr	*Edin. Photo. Club*	7 7	5 21	9 22	11 49
21	Sa	Mr. Margary murdered, 1875	7 5	5 23	9 57	Morn
22	S	**1 Sunday in Lent**	7 3	5 25	10 36	1 1
23	M	*B'burn.* Sir J. Reynolds died 1792	7 1	5 27	11 25	2 8
24	Tu	*Bol. C.*	6 59	5 29	After	3 11
25	W	*Brist. and W. of Eng. Am., Photo. C.*	6 56	5 30	1 29	4 5
26	Th	*Lon. and Prov., L'pool Am., Oldham*	6 54	5 32	2 41	4 53
27	Fr	Barcelona taken, 1808 [*Yorks. Col.*	6 52	5 34	3 57	5 32
28	Sa	Elliott's engagement, 1760, off [Ramsey Bay	6 50	5 36	5 13	6 6

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MARCH.

D M	D W	MEETINGS OF SOCIETIES, &c.	SUN		MOON	
			Rises. H. M.	Sets. H. M.	Rises. After.	Sets. Morn.
1	S	2 Sunday in Lent	6 48	5 38	6 26	6 37
2	M	*W. R. of York., Notts, B'burn*	6 46	5 39	7 39	7 6
3	Tu	*Sheff., Halif., Bol. C., Glos., Bur.*	6 44	5 41	8 51	7 33
4	W	*Pho.C.,P.Ben.,Edn.,N.Staf.,Der.*	6 42	5 43	10 0	8 0
5	Th	*S.Lon.,Lon. and Prov., Glas., Bol.,*	6 40	5 44	11 6	8 28
6	Fr	[*Dund., Leeds, Coven., Brad.*	6 38	5 46	Morn	8 58
7	Sa	St. Perpetua	6 36	5 48	0 7	9 32
8	S	3 Sunday in Lent	6 33	5 50	1 6	10 11
9	M	*B'burn* [*Glas. Am.*	6 31	5 51	1 58	10 55
10	Tu	*Gt. Brit., N'castle-on-T., Bol. C.,*	6 28	5 53	2 46	11 43
11	W	*Cheltenham Am., Bury, Photo. C.*	6 26	5 55	3 29	After
12	Th	*Lon. and Prov., M'chester, B'head*	6 24	5 57	4 6	1 37
13	Fr	*Ireland.*	6 21	5 59	4 38	2 38
14	Sa	British Fleet off Gallipoli, 1878	6 18	6 0	5 8	3 47
15	S	4 Sunday in Lent	6 16	6 2	5 34	4 52
16	M	*B'burn*	6 13	6 4	6 0	6 3
17	Tu	*Bol. C.* St. Patrick.	6 11	6 6	6 26	7 14
18	W	*Photo. C., St. Helens*	6 9	6 8	6 56	8 27
19	Th	*Lon. and Prov.*	6 7	6 9	7 24	9 39
20	Fr	*Edin. Photo. Club*	6 5	6 11	7 59	10 52
21	Sa	Sir G. Jessel died, 1883	6 3	6 12	8 37	Morn
22	S	5 Sunday in Lent	6 1	6 14	9 22	0 1
23	M	*B'burn*	5 59	6 15	10 17	1 5
24	Tu	*Bol. C.*	5 57	6 17	11 20	2 1
25	W	*Brist. and W. of Eng. Am., Phot. C.*	5 54	6 18	After	2 49
26	Th	*Lon.andProv.,L'poolAm.,Oldham*	5 52	6 20	1 40	3 30
27	Fr	James I. d., 1625 [*Yorks. Col.*	5 50	6 22	2 53	4 7
28	Sa	Oxford Lent Term ends	5 47	6 24	4 8	4 37
29	S	Palm Sunday	5 45	6 26	5 20	5 5
30	M	*B'burn*	5 43	6 28	6 30	5 32
31	Tu	*Bol. C.* Haydn born, 1732	5 41	6 30	7 41	5 59

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APRIL.

D M	D W	MEETINGS OF SOCIETIES, &c.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
1	W	*Pho. C., P. Ben., Edn., N. Staf., Der.*	5 38	6 31	8 48	6 28
2	Th	*S. Lon., Lon. and Prov., Glas., Bol.,*	5 36	6 33	9 52	6 56
3	Fr	*[Dund. (An. Mt.), Leeds, Coven.,*	5 34	6 35	10 54	7 30
4	Sa	*[Brad.*	5 31	6 37	11 49	8 6
5	S	Easter Sunday.	5 29	6 38	Morn	8 48
6	M	*W. R of York., Notts, B'burn*	5 27	6 40	0 38	9 34
7	Tu	*Sheff., Halif., Bol. C., Glos., Bur.*	5 24	6 41	1 22	10 27
8	W	*Cheltenham Am., Bury, Photo. C.*	5 22	6 43	2 3	11 23
9	Th	*Lon. and Prov., M'chester, B'head*	5 20	6 44	2 37	After
10	Fr	*Ireland.*	5 18	6 45	3 8	1 28
11	Sa	American Civil War, 1861	5 15	6 47	3 36	2 35
12	S	Low Sunday	5 13	6 48	4 1	3 43
13	M	*B'burn [Glasg. Am.*	5 11	6 50	4 28	4 54
14	Tu	*Gt. Brit., N'castle-on-T., Bol. C.,*	5 9	6 52	4 55	6 8
15	W	*Photo. C., St. Helens*	5 7	6 54	5 22	7 22
16	Th	*Lon. and Prov.*	5 5	6 55	5 55	8 38
17	Fr	*Edin. Photo. Club*	5 2	6 57	6 33	9 50
18	Sa	Cambridge Easter Term begins	5 0	6 59	7 18	10 57
19	S	2 Sunday after Easter	4 58	7 1	8 11	11 56
20	M	*B'burn*	4 56	7 2	9 13	Morn
21	Tu	*Bol. C.*	4 55	7 4	10 20	0 49
22	W	*Brist. and W. of Eng. Am., Phot. C.*	4 53	7 6	11 30	1 32
23	Th	*Lon. and Prov.*	4 51	7 8	After	2 8
24	Fr	Defoe died, 1731	4 49	7 10	1 56	2 39
25	S	Princess Alice born, 1843	4 47	7 11	3 5	3 9
26	S	3 Sunday after Easter	4 45	7 13	4 16	3 35
27	M	*B'burn*	4 43	7 14	5 26	4 2
28	Tu	*Bol. C.* Mutiny of the Bounty, 1789	4 41	7 16	6 33	4 28
29	W	*Photo. C. [Yorks. Col.*	4 39	7 17	7 38	4 57
30	Th	*Lon. and Prov., L'pool Am., Oldham*	4 37	7 19	8 41	5 28

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MAY.

D M	D W	MEETINGS OF SOCIETIES, &c.	SUN Rises. H. M.	SUN Sets. H. M	MOON Rises. After.	MOON Sets. Morn.
1	Fr	Duke of Connaught born, 1850	4 34	7 21	9 39	6 3
2	Sa	Lord Calthorpe died, 1868	4 33	7 23	10 32	6 43
3	S	4 Sunday after Easter	4 31	7 24	11 20	7 28
4	M	*W. R. of York., Notts, B'burn*	4 29	7 26	Morn	8 18
5	Tu	*Sheff., Halif., Bol. C., Glos., Bur.*	4 28	7 27	0 1	9 12
6	W	*Pho.C., P.Ben., Edn., N.Staf., Der.*	4 26	7 29	0 37	10 10
7	Th	*S.Lon., Lon. and Prov., Glas., Bol.,*	4 24	7 30	1 8	11 12
8	Fr	*Ireland.* [*Dund., Leeds, Coven.,*	4 22	7 32	1 36	After
9	Sa	[*Brad.*	4 21	7 34	2 2	1 23
10	S	Rogation Sunday	4 19	7 35	2 28	2 31
11	M	*B'burn* [*Glas. Am.*	4 17	7 36	2 55	3 44
12	Tu	*Gt. Brit., N'castle-on-T., Bol. C.,*	4 16	7 38	3 22	4 56
13	W	*Cheltenham Am., Bury, Photo. C.*	4 14	7 39	3 53	6 13
14	Th	*Lon. and Prov., M'chester, B'head*	4 12	7 41	4 27	7 28
15	F	*Edin. Photo. Club*	4 11	7 42	5 9	8 40
16	Sa	Vendôme Column destroyed, 1871	4 10	7 44	6 0	9 46
17	S	Sunday after Ascension	4 8	7 45	6 59	10 44
18	M	*B'burn*	4 7	7 47	8 6	11 32
19	Tu	*Bol. C.* St. Dunstan	4 5	7 48	9 17	Morn
20	W	*Photo. C., St. Helens*	4 4	7 49	10 31	0 11
21	Th	*Lon. and Prov.*	4 3	7 51	11 45	0 44
22	F	Oxford Easter Term ends	4 1	7 52	After	1 14
23	Sa	Oxford Trinity Term begins	4 0	7 53	2 7	1 42
24	S	Whit Sunday. Pentecost.	3 59	7 55	3 16	2 7
25	M	*B'burn.* Bank Holiday	3 58	7 57	4 25	2 33
26	Tu	*Bol. C.* Hadyn died, 1809	3 57	7 58	5 30	3 0
27	W	*Brist. and W. of Eng. Am., Phot. C.*	3 56	7 59	6 33	3 28
28	Th	*Lon. and Prov., L'pool Am., Oldham*	3 55	8 0	7 32	4 2
29	Fr	[*Yorks. Col.*	3 54	8 1	8 27	4 39
30	Sa	Pope died, 1744	3 53	8 2	9 16	5 22
31	S	Trinity Sunday	3 52	8 3	10 0	6 10

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JUNE.

D M	D W	MEETNGS OF SOCIETIES, &c.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
1	M	*W. R. of York., Notts, B'burn*	3 51	8 4	10 38	7 3
2	Tu	*Sheff., Halif., Bol. C., Glos., Bur.*	3 50	8 5	11 10	8 0
3	W	*Pho. C., P. Ben., Edn., N. Staf., Der.*	3 50	8 6	11 40	9 0
4	Th	*S. Lon., Lon. and Prov., Coven.,*	3 49	8 7	Morn	10 2
5	Fr	Webber died, 1876 [*Leeds, Brad.*	3 49	8 8	0 7	11 7
6	Sa	Count Cavour died, 1861	3 48	8 9	0 30	After
7	**S**	1 Sunday after Trinity	3 47	8 10	0 55	1 21
8	M	*B'burn*	3 47	3 11	1 22	2 32
9	Tu	*Gt. Brit., Bol. C., Glas. Am.*	3 46	8 12	1 50	3 47
10	W	*Bury, Photo. C.*	3 46	8 12	2 21	5 2
11	Th	*Lon. and Prov., B'head*	3 45	8 13	2 59	6 16
12	Fr	Money Market panic, 1866	3 45	8 14	3 45	7 27
13	Sa	Berlin Congress, 1878	3 45	8 15	4 41	8 31
14	**S**	2 Sunday after Trinity	3 45	8 16	5 45	9 24
15	M	*B'burn.* Thos. Campbell d., 1844	3 44	8 16	6 58	10 9
16	Tu	*Bol. C.* Duke of Marlboro' d., 1722	3 44	8 17	8 13	10 46
17	W	*Photo. C., St. Helens*	3 44	8 17	9 29	11 18
18	Th	*Lon. and Prov.*	3 44	8 18	10 45	11 47
19	Fr	*Edin. Photo. Club*	3 44	8 18	11 46	Morn
20	Sa	Accession of Queen Victoria	3 44	8 19	After	0 12
21	**S**	3 Sunday after Trinity	3 44	8 19	2 16	0 39
22	M	*B'burn*	3 45	8 19	3 22	1 4
23	Tu	*Bol. C.*	3 45	8 19	4 25	1 32
24	W	*Brist. and W. of Eng. Am., Phot. C.*	3 45	8 19	5 25	2 3
25	Th	*Lon. and Prov. (Ann. Meet.), L'pool*	3 46	8 18	6 22	2 39
26	Fr	[*Am., Oldham, Yorks. Col.*	3 46	8 18	7 14	3 20
27	Sa	Hiram Powers died, 1873	3 47	8 18	7 59	4 6
28	**S**	4 Sunday after Trinity	3 47	8 18	8 39	4 57
29	M	*B'burn.* St. Peter	3 48	8 18	9 14	5 52
30	Tu	*Bol. C.* William Roscoe d., 1831	3 49	8 18	9 45	6 52

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JULY.

D M.	D W	Meetings of Societies, &c.	Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. After.	Moon Sets. Morn.
1	W	*Pho. C., P. Ben., N. Staff., Der.*	3 49	8 17	10 11	7 53
2	Th	*Lon and Prov., Coven., Leeds, Brad.*	3 49	8 17	10 37	8 56
3	Fr	Battle of Sadowa, 1866	3 50	8 16	11 0	10 1
4	Sa	American Independence, 1776	3 51	8 16	11 25	11 5
5	S	5 Sunday after Trinity	3 52	8 16	11 51	After
6	M	*Notts, B'burn*	3 53	8 16	Morn	1 26
7	Tu	*Sheff., Halif., Bol. C., Glos., Bur.*	3 54	8 15	0 19	2 39
8	W	*Bury, Photo. C.*	3 55	8 15	0 54	3 52
9	Th	*Lon. and Prov., B'head*	3 56	8 14	1 33	5 3
10	Fr	Calvin born, 1507	3 57	8 14	2 22	6 10
11	Sa	Oxford Trinity Term ends	3 58	8 13	3 23	7 10
12	S	6 Sunday after Trinity	3 59	8 12	4 32	7 59
13	M	*B'burn.* Dr. Bradley died, 1752	4 0	8 11	5 48	8 41
14	Tu	*Bol. C., Glas. Am.*	4 1	8 10	7 7	9 16
15	W	*Photo. C., St. Helens (An. Meet.)*	4 2	8 9	8 25	9 48
16	Th	*Lon. and Prov.*	4 3	8 8	9 40	10 16
17	Fr	*Edin. Photo. Club*	4 4	8 7	10 53	10 43
18	Sa	Dean Stanley died, 1881	4 5	8 6	After	11 10
19	S	7 Sunday after Trinity	4 6	8 5	1 11	11 37
20	M	*B'burn*	4 8	8 4	2 16	Morn
21	Tu	*Bol. C.* Robert Burns died, 1796	4 9	8 3	3 18	0 7
22	W	*Brist. and W. of Eng. Am., Phot. C.*	4 10	8 2	4 15	0 41
23	Th	*Lon. and Prov.*	4 11	8 0	5 9	1 20
24	Fr	Princess Vict. of Prussia b., 1860	4 12	7 58	5 57	2 4
25	Sa	Great Fire at Baltimore, 1873	4 14	7 56	6 39	2 53
26	S	8 Sunday after Trinity	4 15	7 54	7 16	3 46
27	M	*B'burn*	4 17	7 53	7 48	4 45
28	Tu	*Bol. C.* Great defeat of the Turks,	4 19	7 51	8 17	5 45
29	W	*Photo. C.* [1877	4 21	7 50	8 42	6 49
30	Th	*Lon. and Prov., L'pool Am., Oldham*	4 23	7 49	9 7	7 53
31	Fr	Gray died, 1771 [*Yorks. Col.*	4 24	7 47	9 31	8 58

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AUGUST.

D M	D W	MEETINGS OF SOCIETIES, &c.	SUN		MOON	
			Rises. H. M.	Sets. H. M.	Rises. After.	Sets. Morn.
1	Sa	Lammas Day	4 25	7 46	9 56	10 6
2	S	9 Sunday after Trinity	4 27	7 44	10 23	11 13
3	M	*Notts, B'burn*	4 28	7 43	10 53	After
4	Tu	*Sheff., Halif., Bol. C., Glos., Bur.*	4 29	7 41	11 29	1 34
5	W	*Pho. C., P. Ben., N. Staff., Der.*	4 31	7 40	Morn	2 44
6	Th	*Lon. and Prov., Coven., Leeds, Brad.*	4 33	7 38	0 12	3 51
7	Fr	Name of Jesus	4 35	7 36	1 6	4 52
8	Sa	Trinity Law Sittings end.	4 36	7 34	2 8	5 47
9	S	10 Sunday after Trinity	4 38	7 32	3 19	6 33
10	M	*B'burn.* St. Lawrence	4 39	7 31	4 37	7 12
11	Tu	*Bol. C., Glas. Am.*	4 41	7 29	5 56	7 45
12	W	*Bury, Photo. C.*	4 43	7 27	7 15	8 16
13	Th	*Lon. and Prov., B'head*	4 44	7 25	8 31	8 43
14	Fr	Cetewayo at Osborne, 1882	4 45	7 23	9 44	9 11
15	Sa	Earl of Lonsdale died, 1876	4 46	7 21	10 56	9 41
16	S	11 Sunday after Trinity	4 48	7 19	After	10 10
17	M	*B'burn.* Duchess of Kent b., 1786	4 49	7 17	1 7	10 43
18	Tu	*Bol. C.* Battle of Gravelotte, 1870	4 51	7 15	2 8	11 19
19	W	*Photo. C., St. Helens*	4 52	7 13	3 3	Morn
20	Th	*Lon. and Prov.*	4 54	7 11	3 52	0 1
21	Fr	*Edin. Photo. Club*	4 55	7 9	4 38	0 48
22	Sa	Great Fire at Bordeaux, 1879	4 57	7 7	5 16	1 41
23	S	12 Sunday after Trinity	4 59	7 5	5 50	2 36
24	M	*B'burn.* St. Bartholomew	5 0	7 3	6 20	3 38
25	Tu	*Bol. C.* [*Brit. Assoc. in Aberdeen*	5 2	7 1	6 47	4 40
26	W	*Brist. and W. of Eng. Am., Pho. C.,*	5 3	6 59	7 13	5 44
27	Th	*Lon. and Prov., L'pool Am., Oldham*	5 5	6 57	7 36	6 49
28	Fr	St. Augustine [*Yorks. Col.*	5 7	6 55	8 2	7 57
29	Sa	Birmingham Mus. Fest. op., 1882	5 8	6 53	8 27	9 5
30	S	13 Sunday after Trinity	5 10	6 51	8 58	10 13
31	M	*B'burn.* John Bunyan died, 1688	5 12	6 48	9 31	11 22

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SEPTEMBER.

D M	D W	Meetings of Societies, &c.	Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. After.	Moon Sets. After.
1	Tu	*Sheff., Halif., Bol. C., Glos., Bur.*	5 13	6 46	10 11	0 32
2	W	*Pho. C., P. Ben., N. Staff., Der.*	5 15	6 44	10 58	1 38
3	Th	*Lon. and Prov., Bol., Leeds, Coven.,*	5 16	6 42	11 54	2 41
4	Fr	[*Glasg.* (*Ann. Mt.*), *Brad.*	5 18	6 40	Morn	3 37
5	Sa	Dr. Dalton born, 1766	5 20	6 37	0 59	4 26
6	S	14 Sunday after Trinity	5 21	6 35	2 11	5 6
7	M	*Notts, B'burn*	5 23	6 32	3 27	5 41
8	Tu	*Bol. C., Glas. Am.*	5 24	6 29	4 46	6 14
9	W	*Bury, Photo. C.*	5 26	6 27	6 4	6 42
10	Th	*Lon. and Prov., M'chester, B'head*	5 27	6 25	7 22	7 11
11	Fr	[Embankment, 1880	5 29	6 23	8 34	7 38
12	Sa	Cleopatra's Needle erec. on Thames	5 31	6 20	9 42	8 9
13	S	15 Sun. after Trinity	5 32	6 18	10 52	8 42
14	M	*B'burn.* Holy Cross Day	5 34	6 16	11 55	9 17
15	Tu	*Bol. C.* British arr. at Cairo, 1882	5 35	6 14	After	9 58
16	W	*Photo. C., St. Helens*	5 37	6 12	1 47	10 43
17	Th	*Lon. and Prov.*	5 38	6 9	2 33	11 33
18	Fr	*Edin. Photo. Club*	5 40	6 7	3 14	Morn
19	Sa	Archbishop of Utrecht died, 1880	5 42	6 5	3 50	0 28
20	S	16 Sun. after Trinity	5 43	6 2	4 22	1 26
21	M	*B'burn.* St. Matthew	5 45	6 0	4 48	2 28
22	Tu	*Bol. C.* Lord Denman died, 1854	5 47	5 58	5 16	3 31
23	W	*Brist. and W. of Eng. Am., Phot. C.*	5 48	5 56	5 40	4 38
24	Th	*Lon. and Prov., L'pool Am., Oldham*	5 50	5 54	6 6	5 45
25	Fr	Porson died, 1808 [*Yorks. Col.*	5 51	5 52	6 33	6 53
26	Sa	St. Cyprian	5 53	5 50	7 0	8 3
27	S	17 Sun. after Trinity	5 55	5 47	7 33	9 12
28	M	*B'burn.* Strasbourg capt., 1870	5 56	5 45	8 10	10 23
29	Tu	*Bol. C.* Michaelmas Day.	5 58	5 43	8 54	11 32
30	W	*Photo. C.* St. Jerome	5 59	5 41	9 48	After

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OCTOBER.

D M	D W	MEETINGS OF SOCIETIES, &c.	SUN		MOON	
			Rises. H. M.	Sets. H. M.	Rises. After.	Sets. Afrer.
1	Th	*S. Lon., Lon. and Prov., Glas., Bol.*	6 1	5 40	10 49	1 32
2	Fr	[(*An. Mt.*), *Dund., Leeds, Coven.,*	6 3	5 38	11 57	2 21
3	Sa	[*Brad.* (*Ann. Meet.*)	6 5	5 35	Morn	3 3
4	S	18 Sun. after Trinity	6 7	5 32	1 11	3 39
5	M	*W.R.of York, Notts, B'burn* [*Bol.C.,Bur.*	6 9	5 29	2 26	4 12
6	Tu	*Shef.(An.M.).Halif.(An.M.).Glos.(An.M.)*	6 10	5 27	3 44	4 41
7	W	*Pho. C., P. Ben., Edn., N. Staf., Der.*	6 12	5 24	4 58	5 8
8	Th	*Lon. and Prov., Manches.* (*An. Mt.*)	6 14	5 22	6 11	5 37
9	Fr	*Ireland.* [*B'head*	6 16	5 20	7 24	6 6
10	Sa	Oxford Michaelmas Term begins	6 17	5 18	8 34	6 38
11	S	19 Sun. after Trinity	6 19	5 15	9 40	7 13
12	M	*B'burn*	6 20	5 13	10 41	7 51
13	Tu	*Bol. C., Glasg. Am., N'castle-on-T.*	6 22	5 10	11 38	8 35
14	W	*Bury* (*An. Mt.*), *Photo. C.*	6 24	5 8	After	9 24
15	Th	*Lon. and Prov.*	6 25	5 6	1 10	10 16
16	Fr	*Edin. Photo. Club*	6 27	5 4	1 49	11 14
17	Sa	First Hospital Saturday, 1874	6 28	5 2	2 21	Morn
18	S	20 Sun. after Trinity	6 30	5 0	2 51	0 13
19	M	*B'burn.* Dean Swift died, 1745	6 31	4 58	3 18	1 17
20	Tu	*Bol. C.* Austrians capt. Bosnia,	6 32	4 56	3 43	2 22
21	W	*Phot. C., St. Helens* [1878	6 34	4 54	4 7	3 28
22	Th	*Lon. and Prov.*	6 36	4 52	4 32	4 37
23	Fr	Edward G. Earl of Derby d., 1869	6 38	4 50	5 1	5 47
24	Sa	Manchester Post Office burnt, 1880	6 40	4 47	5 32	6 59
25	S	21 Sun. after Trinity	6 42	4 45	6 8	8 11
26	M	*B'burn.* Hogarth died, 1861	6 44	4 43	6 51	9 22
27	Tu	*Bol. C.* [*Photo. C.*	6 46	4 41	7 43	10 30
28	W	*Brist. and W. of Eng. Am.* (*An. Mt.*)	6 48	4 39	8 42	11 30
29	Th	*Lon. and Prov., L'pool Am., Oldham*	6 50	4 37	9 47	After
30	Fr	[(*An. Mt.*), *Yorks. Col.*	6 51	4 36	10 59	1 4
31	Sa	Thames Steam Ferry opd., 1877	6 53	4 34	Morn	1 42

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NOVEMBER.

D M	D W	Meetings of Societies, &c.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. Morn.	MOON Sets. After.
1	S	22 Sun. after Trinity [*B'burn*	6 55	4 32	0 13	2 14
2	M	*W. R. of York.* (*An. Mt.*), *Notts,*	6 56	4 31	1 27	2 45
3	Tu	*Sheff., Halif., Bol. C., Glos., Bur.* [*Der.*	6 59	4 29	2 40	3 11
4	W	*Ph.C., Ben., Edn (A.Mt.) N.Staf. (A.Mt.),*	7 1	4 27	3 54	3 38
5	Th	*S. Lon., Lon. and Prov., Glas., Bol.,*	7 2	4 26	5 5	4 5
6	Fr	[*Dun., Leeds, Coven.* (*A. Mt.*), *Brad.*	7 4	4 24	6 16	4 36
7	Sa	Claycross Colliery Explos'n, 1882	7 6	4 23	7 23	5 8
8	S	23 Sun. after Trinity	7 7	4 22	8 28	5 45
9	M	*B'burn* [*Glasg. Am.*	7 9	4 20	9 27	6 27
10	Tu	*Gt. Brit., N'castle-on-T., Bol. C.,*	7 10	4 19	10 22	7 14
11	W	*Chelt. Am.* (*A. Mt.*), *Bury, Phot. C.*	7 12	4 18	11 7	8 5
12	Th	*Lon. and Prov., M'chester, B'head*	7 14	4 16	11 47	9 1
13	Fr	*Ireland* (*An. Mt.*)	7 16	4 14	After	10 0
14	Sa	Earl of Elgin died, 1881	7 18	4 12	0 52	11 1
15	S	24 Sun. after Trinity	7 20	4 11	1 18	Morn
16	M	*B'burn.* John Bright born, 1811	7 22	4 10	1 44	0 3
17	Tu	*Bol. C.* Queen Elizabeth's Day	7 23	4 9	2 8	1 9
18	W	*Photo. C., St. Helens*	7 25	4 8	2 33	2 16
19	Th	*Lon. and Prov.*	7 27	4 7	3 0	3 24
20	Fr	*Edin. Photo. Club*	7 28	4 6	3 28	4 36
21	Sa	Princess Royal born, 1840	7 30	4 5	4 2	5 39
22	S	25 Sun. after Trinity	7 31	4 3	4 43	7 3
23	M	*B'burn.* St. Clement	7 33	4 2	5 32	8 14
24	Tu	*Bol. C.* John Knox died, 1574	7 35	4 0	6 31	9 19
25	W	*Brist. and W. of Eng. Am., Phot. C.*	7 36	3 58	7 35	10 17
26	Th	*Lon. and Prov., L'pool Am.* (*Ann.*	7 38	3 57	8 48	11 5
27	Fr	[*Meet.*), *Oldham, Yorks. Col.*	7 39	3 56	10 2	11 46
28	Sa	*The Times* first printed by steam,	7 40	3 55	11 16	After
29	S	1 Sunday in Advent. [1814	7 42	3 54	Morn	0 49
30	M	*B'burn.* St. Andrew	7 44	3 54	0 31	1 18

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DECEMBER.

D M	D W	MEETINGS OF SOCIETIES, &c.	SUN		MOON	
			Rises. H. M.	Sets. H. M.	Rises. Morn.	Sets. After.
1	Tu	*Sheff., Halif., Bol. C., Glos., Bur.*	7 46	3 52	1 43	1 44
2	W	*Pho.C., P.Ben., Edn., N.Staf., Der.(A.Mt.)*	7 47	3 52	2 54	2 10
3	Th	*S. Lon. (An. Meet.), Lon. and Prov.,*	7 48	3 51	4 4	2 38
4	Fr	*[Glas., Bol., Dund., Coven.,*	7 49	3 51	7 12	3 8
5	Sa	*[Leeds (An. Mt.), Brad.*	7 51	3 51	6 16	3 43
6	**S**	**2 Sunday in Advent**	7 52	3 51	7 17	4 21
7	M	*W.R. of York, Notts, B'burn [An. Mt.*	7 53	3 50	8 13	5 6
8	Tu	*Gt. Brit., Bol. C., N'castle-on-T., Glas. Am.*	7 55	3 50	9 3	5 56
9	W	*Cheltenham Am., Bury, Phot. C.*	7 56	3 50	9 45	6 50
10	Th	*Lon. and Prov., M'chester, B'head*	7 57	3 49	10 23	7 48
11	Fr	*Ireland.* Chas. XII. killed, 1718	7 58	3 49	10 54	8 47
12	Sa	Lord Hood born, 1724	7 59	3 49	11 22	9 50
13	**S**	**3 Sunday in Advent**	8 0	3 49	11 48	10 53
14	M	*B'burn*	8 0	3 49	After	11 58
15	Tu	*Bol. C.*	8 1	3 49	0 35	Morn
16	W	*Photo. C., St. Helens*	8 2	3 49	0 59	1 4
17	Th	*Lon. and Prov.* Oxford Mich'mas	8 3	3 49	1 26	2 11
18	Fr	*Edin. Photo. Club* [Term ends	8 4	3 50	1 56	3 23
19	Sa	Camb. Michaelmas Term ends	8 5	3 51	2 32	4 35
20	**S**	**4 Sunday in Advent**	8 5	3 51	3 16	5 48
21	M	*B'burn.* Mich. Law Sittings end	8 6	3 51	4 11	6 58
22	Tu	*Bol. C.*	8 6	3 52	5 16	8 2
23	W	*Brist. and W. of Eng. Am., Phot. C.*	8 6	3 52	6 27	8 57
24	Th	W. M. Thackeray died, 1863	8 7	3 53	7 43	9 44
25	Fr	Christmas Day.	8 7	3 53	9 0	10 21
26	S	Bank Holiday. Boxing Day	8 7	3 54	10 17	10 55
27	**S**	**1 Sunday after Christmas**	8 8	3 55	11 32	11 24
28	M	*B'burn.* Innocents' Day.	8 8	3 56	Morn	11 50
29	Tu	*Bol. C.* W. E. Gladstone b., 1809	8 9	3 56	3 43	After
30	W	*Photo. C. [Yorks. Col.*	8 9	3 57	1 54	0 43
31	Th	*Lon. and Prov., L'pool Am., Oldham*	8 9	3 58	3 2	1 12

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PHASES OF THE MOON.

JANUARY.		FEBRUARY.	
Last Quarter,	8..5h. 37m. M.	Last Quarter,	6..10h. 38m. A.
New Moon,	16..8h. 37m. M.	New Moon,	15.. 2h. 22m. M.
First Quarter,	24..1h. 26m. M.	First Quarter,	22..10h. 31m. M.
Full Moon,	30..4h. 19m. A.		

PHOTOGRAPHIC SOCIETIES, &c.

Photographic Society of Great Britain.

ESTABLISHED 1853.

The Ordinary Meetings are held at the Gallery of the Royal Society of Painters in Water-Colours, 5A, Pall Mall East, at Eight o'clock p.m., on the second Tuesday of each month from November to June inclusive. Annual General Meeting on the second Tuesday in February. Extra Meetings, called "Technical Meetings," are held on the fourth Tuesday in each month.

COUNCIL AND OFFICERS.

President—James Glaisher, F.R.S., F.R.A.S.

Vice-Presidents—John Spiller, F.C.S.; Col. H. Stuart Wortley.

Treasurer—Walter S. Bird.

Council—Captain W. de W. Abney, R.E., F.R.S., W. Ackland, Francis Bedford, W. Bedford, H. B. Berkeley, Valentine Blanchard, T. Bolas, F.C.S., W. B. Bolton, Alexander Cowan, T. S. Davis, F.C.S., W. F. Donkin, W. England, P. Jennings, F. Maxwell-Lyte, F.C.S., H. P. Robinson, J. Swan, F.C.S., and Leon Warnerke.

Hon. Secretary—W. F. Donkin, M.A., F.C.S., F.I.C., Upper Tulse Hill, S.W.

Assistant Secretary—Edwin Cocking, 57, Queen's Road, Peckham, S.E.

☞ At the Annual Meeting to be held in February a change will take place in the constitution of the Council, as a certain proportion of the members of that body retire annually, by rotation, and their successors will be appointed at the meeting in February.

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South London Photographic Society.

ESTABLISHED 1859.

The Ordinary Meetings are held in the Rooms of the Society of Arts, John Street, Adelphi, at Eight o'clock p.m., on the first Thursday in each month, from January to June inclusive, and from October to December. Annual Meeting in December.

President—W. Ackland.

Vice-Presidents—T. Bolas, H. Trueman Wood, and F. York.

Committee—Messrs. W. Ashman, W. M. Ayres, W. K. Burton, W. Cobb, T. J. Collins, E. Dunmore, J. A. Harrison, C. Hussey, Jun., G. A. Garrett, W. H. Prestwich, C. Poirson, and H. Wilmer.

Honorary Secretary and Treasurer—F. A. Bridge, East Lodge, Dalston Lane, London.

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[*See Advertisements, pages* xix. *to* xxi.

PHASES OF THE MOON.

MARCH.

Full Moon,	1..	4h. 0m. M.
Last Quarter,	8..	6h. 54m. A.
New Moon,	16..	5h. 37m. A.
First Quarter,	23..	5h. 3m. A.
Full Moon,	30..	4h. 40m. A.

APRIL.

Last Quarter,	7..	2h. 43m. A.
New Moon,	15..	5h. 51m. M.
First Quarter,	21..	11h. 20m. A.
Full Moon,	29..	6h. 14m. M.

London and Provincial Photographic Association.

ESTABLISHED 1882.

Meetings are held every Thursday Evening, at Mason's Hall Tavern, Mason's Avenue, Basinghall Street, E.C., at Eight o'clock. The Annual Meeting is held on the last Thursday in June. Members resolve themselves into Committee on the last Thursday Evening in each month.

Trustees—W. K. Burton and W. Cobb.

Treasurer—W. H. Prestwich.

Curator—A. Haddon, Royal Naval College, Greenwich.

Hon. Secretary—J. J. Briginshaw, Grosvenor Park Road, Walthamstow.

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Photographic Club.

ESTABLISHED 1879.

The Club meets every Wednesday evening, at Anderton's Hotel, Fleet Street, E.C., at Seven o'clock. One hour (Eight to Nine) is devoted to the discussion of technical business, and the remainder of the evening to social purposes. The officers all retire in November each year, but are eligible for re-election.

Trustees—F. York and W. Ackland.

Librarian—T. Charters White.

Curator—E. Clifton.

Committee—W. Bedford, A. Cowan, E. W. Foxlee, H. Wilmer, J. Nesbit, G. F. Williams, C. Ray-Woods, A. Mackie.

Secretary and Treasurer—E. Dunmore, Sunnycote, Southhill Park, Hampstead, N.W.

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Manchester Photographic Society.

ESTABLISHED 1855.

The Ordinary Meetings are held at the Manchester Technical School, at Seven o'clock p.m., on the second Thursday of each month, from September to May, inclusive. Annual Meeting on the second Thursday in October.

President—John S. Pollitt.

Vice-Presidents—Rev. Canon Beechey, M.A., Dr. C. P. Bahin, A. Brothers, F.R.A.S., John Dale, and J. W. Leigh.

Council—R. Atherton, A. Garnett, J. Greatorex, Charles Harris, F.R.G.S., John Kershaw, S. D. McKellen, E. Openshaw, John Schofield, J. Warburton, and N. Wright.

Hon. Treasurer—W. G. Coote.

Hon. Secretary—W. J. Chadwick, Prince's Bridge Iron Works, Manchester.

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[*See Advertisements, pages* xix. *to* xxi.

PHASES OF THE MOON.

MAY.		
Last Quarter,	7..	8h. 43m. M.
New Moon,	14..	3h. 18m. A.
First Quarter,	21..	5h. 45m. M.
Full Moon,	28..	8h. 31m. A.

JUNE.		
Last Quarter,	6..	0h. 5m. M.
New Moon,	12..	10h. 42m. A.
First Quarter,	19..	1h. 49m. A.
Full Moon,	27..	11h. 18m. M.

British Association for the Advancement of Science.

ESTABLISHED 1831.

22, ALBEMARLE STREET, LONDON, W.

The next Annual Meeting will be held at Aberdeen, commencing September 9th, 1885.

President—Prof. Lord Rayleigh, D.C.L., F.R.S.

President-Elect—Sir Lyon Playfair, K.C.B., F.R.S.

Treasurer—Prof. A. W. Williamson, Ph.D., F.R.S.

General Secretaries—Capt. Douglas Galton, C.B., F.R.S., and A. G. Vernon Harcourt, Esq., F.R.S.

Secretary—Prof. Bonney, D.Sc., F.R.S., 22, Albemarle Street, London, W.

Amateur Photographic Association.

ESTABLISHED 1861.

YORK HOUSE, YORK PLACE, LONDON, W.

President—His Royal Highness the Prince of Wales.

Vice-Presidents—His Grace the Archbishop of York, the Most Noble the Marquis of Drogheda, the Right Hon. the Lord de Ros, the Right Hon. the Earl of Rosse, F.R.S.

Council—A. Farre, M.D., F.R.S., &c., James Glaisher, F.R.S., F.R.A.S., &c., J. D. Llewelyn, F.R.S., George Shadbolt, W. D. Howard, F.I.C., Captain J. C. A. Lewis, M.A. (*Cantab.*), Sir Spencer Maryon Wilson, Bart., and C. Stephens, M.A. (*Oxon.*).

Referees—James Glaisher, F.R.S., F.R.A.S., W. D. Howard, F.I.C.

Hon. Secretary—A. J. Melhuish, F.R.A.S., F.R.M.S., York House, York Place, Portman Square, W.

Glasgow Photographic Association.

ESTABLISHED 1862.

The Ordinary Meetings are held at the Religious Institution Rooms, 177, Buchanan Street, at Eight o'clock p.m., on the first Thursday of each month, from September to April. Annual Meeting first Thursday in September. Election Meeting last Thursday in April.

President—Councillor Robertson.

Vice-Presidents—Robert Dodd and John Parker.

Council—J. Craig Annan, George Mason, James McGhie, John M. Skinner, William Lang, Jun., and P. Falconer.

Treasurer—George Bell.

Secretary—John Lennox, 6, Armadale Street.

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[*See Advertisement, page* xxii.

PHASES OF THE MOON.

JULY.		
Last Quarter,	5..	0h. 26m. A.
New Moon,	12..	5h. 16m. M.
First Quarter,	19..	0h. 20m. M.
Full Moon,	27..	2h. 23m. M.

AUGUST.		
Last Quarter,	3..	9h. 55m. A.
New Moon,	10..	0h. 14m. A.
First Quarter,	17..	1h. 47m. A.
Full Moon,	25..	5h. 25m. A.

Edinburgh Photographic Society.

ESTABLISHED 1861.

The Ordinary Meetings are held at the Hall, 5, St. Andrew Square, at Eight o'clock p.m., on the first Wednesday of each month, excluding July, August, and September. Annual Meeting on the first Wednesday in November.

Patron—His Royal Highness the Duke of Edinburgh.

President—Norman Macbeth, R.S.A.

Vice-Presidents—J. G. Tunny and Wm. Forgan.

Council—Thomas H. W. Knolles, J. Stewart Smith, James Balmain, A. B. Stewart, Thos. Wardale, Jun., Samuel Tamkin, J. M'Kean, James Crighton, Wm. Crooke, G. G. Mitchell, and Hugh Brebner.

Hon. Treasurer—A. M. Forbes.

Hon. Secretary—W. T. Bashford, Argyle House, Portobello, Midlothian.

Curator—J. M. Turnbull.

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Liverpool Amateur Photographic Association.

ESTABLISHED 1863.

The Ordinary Meetings are held at the Free Public Library and Museum, William Brown Street, at Six o'clock p.m., on the last Thursday in each month, with the exception of December. Annual Meeting on the last Thursday in November.

President—J. H. Day.

Vice-Presidents—A. W. Beer and P. H. Phillips.

Council—W. Atkins, Rev. G. J. Banner, Rev. T. B. Banner, J. A. Forrest, R. Crowe, W. H. Kirkby, G. A. Kenyon, M.D., Rev. H. J. Palmer, H. Rutter, Rev. A. J. Scott, E. Twigge, and W. A. Watts.

Treasurer—J. H. T. Ellerbeck.

Secretary—H. N. Atkins, 466, New Chester Road, Rock Ferry.

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Oldham Photographic Society.

ESTABLISHED 1867.

The Ordinary Meetings are held at The Lyceum, Oldham, at Eight o'clock p.m., on the last Thursday in each month. Annual Meeting on the last Thursday in October.

President—John Risley.

Vice-President—James Hall.

Council—Daniel Buckley, James Wrigley, Alfred Knott, James Garside, Sen., Jeremiah Green, Frank Collins, and John Fullalove.

Hon. Treasurer—W. E. Clegg.

Hon. Secretary—John Greaves, Jun., 146, Greengate Street, Oldham.

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[*See Advertisements, pages* xix. *to* xxi.

PHASES OF THE MOON.

SEPTEMBER.		
Last Quarter,	2..	5h. 15m. M.
New Moon,	8..	8h. 43m. A.
First Quarter,	16..	6h. 15m. M.
Full Moon,	24..	7h. 55m. M.

OCTOBER.		
Last Quarter,	1..	11h. 29m. M.
New Moon,	8..	7h. 31m. M.
First Quarter,	16..	1h. 21m. M.
Full Moon,	23..	9h. 23m. A.
Last Quarter,	30..	5h. 58m. A.

Amateur Photographic Field Club.

ESTABLISHED 1858.

Outdoor Meetings are held every month during the summer, beginning in April. Indoor meetings for discussion and exhibition of work are held during the winter. The Club is limited to twenty-five members. Particulars from the Hon. Secretary.

President—J. C. Stenning.

Hon. Secretary—W. Wainwright, Jun., Hoe Place, Woking.

Cheltenham Photographic Society.

ESTABLISHED 1865.

The Ordinary Meetings are held at half-past Seven o'clock p.m., on the second Thursday in each month, from November to April. Annual General Meeting in November.

President—Col. Francis Dawson, C.B.

Committee—W. C. Beetham, B. Jones, G. S. Penny, and the Officers.

Treasurer—John Bull.

Hon. Sec.—Clifford E. F. Nash, M.A., Glenfall Lawn, Cheltenham.

Photographers' Benevolent Association.

ESTABLISHED 1873.

The Ordinary Meetings are held at the Offices, 181, Aldersgate Street, at Eight o'clock p.m., on the first Wednesday of each month.

Established to assist members, their wives, and children when in distress through sickness, death, or want of employment, by means of immediate grants of money; to grant annual pensions to aged members; and to aid the unemployed members in obtaining situations. Employers requiring Assistants are requested to communicate with Secretary. Subscriptions—Members 10s., payable yearly, half-yearly, or quarterly. Donations of any amount will be received. Book of Rules free on application.

Trustees—Col. Stuart Wortley, Capt. W. de W. Abney, R.E., F.R.S., &c.

Board of Management—W. S. Bird (Chairman), H. J. Thorne (Deputy-Chairman), W. M. Ashman, H. J. Burton, T. Bolas, F. H. Berry, A. J. Brown, T. J. Collins, E. G. Ganly, J. A. B. Hall, F. J. Mitchell, J. S. Rolph, S. Saunders, and R. E. Wilkinson.

Auditors—G. Taylor and J. S. Rolph.

Secretary—Henry Harland, 181, Aldersgate Street, E.C., and 83, Hawksley Road, Stoke Newington, N.

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[*See Advertisements, pages* xix. *to* xxi.

PHASES OF THE MOON.

NOVEMBER.		DECEMBER.	
New Moon,	6.. 9h. 3m. A.	New Moon,	6.. 1h. 17m. A.
First Quarter,	14..10h. 0m. A.	First Quarter,	14.. 6h. 22m. A.
Full Moon,	22.. 9h. 39m. M.	Full Moon,	21.. 8h. 59m. A.
Last Quarter,	29.. 1h. 57m. M.	Last Quarter,	28.. 0h. 22m. A.

West Riding of Yorkshire Photographic Society.

ESTABLISHED 1874.

The Ordinary Meetings are held at the Market Tavern Hotel, Godwin Street, Bradford, at half-past Seven o'clock p.m., on the first Monday in each month, except June, July, August, and September. Annual Meeting on the first Monday in November. Subject to revision.

President—E. Passingham.

Vice-President—J. Howarth.

Council—T. C. Bridges, R. Broadhead, J. Garatt, E. Greaves, E. T. Jenkins, T. Ledgard, J. S. Shaw, J. Smith, and E. Wormald.

Treasurer—T. Illingworth.

Secretary—J. Crosthwaite, 46, Great George Street, Leeds.

◆

Sheffield Photographic Society.

ESTABLISHED 1876.

The Ordinary Meetings are held at the Freemasons' Hall, Surrey Street, at half-past Seven o'clock p.m., on the first Tuesday in each month. Annual Meeting in October.

President—W. B. Hatfield.

Vice-Presidents—Councillor T. Firth and Dr. T. H. Morton, M.D.

Council—Messrs. Bacon and Turner.

Treasurer—T. S. Yeomans.

Secretary—Joseph Taylor, Holland Place, London Road, Sheffield.

◆

Bristol & West of England Amateur Photographic Association.

RE-ESTABLISHED 1876.

The Ordinary Meetings are held at the Association Studio, Portland Street, Kingsdown, at Eight o'clock p.m., on the fourth Wednesday in each month. Annual Meeting on the fourth Wednesday in October.

President—T. Davey.

Vice-Presidents—Rev. W. J. Whiting, M.A., and Col. Playfair.

Council—W. W. Boyden, P. Munro, J. Phillips, and Officers.

Treasurer—Edward Brightman.

Hon. Secretary—H. A. Hood Daniel, Avonmead, Leigh Road, Clifton, Bristol.

☞ All amateurs in town on days of meeting will be made welcome.

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[*See Advertisements, pages* xix. *to* xxi.

Photographic Society of Ireland.

ESTABLISHED 1879.

The Ordinary Meetings are held in the Royal College of Science, Dublin, on the second Friday in each month, except June, July, August, and September. Annual Meeting on the second Friday in November.

President—Dr. J. Emerson Reynolds, F.R.S.

Vice-President—Howard Grubb, F.R.S.

Council—Prof. Barrett, F.R.S.C.E., Herbert Bewley, Prof. Hartley, F.R.S., E. P. Johnson, Thomas Mayne, M.P., George Mansfield, J.P., Greenwood Pim, M.A., John L. Robinson, John V. Robinson, and Joseph H. Woodworth.

Hon. Treasurer—Thomas Arthur Bewley.

Hon. Secretary—Alex. Conan, 1, Carlton Villas, Shelbourne Road, Dublin.

◆

Dundee and East of Scotland Photographic Association.

ESTABLISHED 1879.

The Ordinary Meetings are held at Lamb's Hotel, Reform Street, Dundee, at Eight o'clock p.m., on the first Thursday in each month, from October to May inclusive. Annual Meeting in April.

Patron—The Earl of Strathmore.

President—James C. Cox.

Vice-Presidents—W. D. Valentine and David Ireland.

Council—G. D. Macdougald, A. C. Lamb, H. G. Fraser, J. Geddes, Alfred Guthrie, and G. F. Roger.

Hon. Treasurer—John Robertson.

Hon. Secretary—D. Ireland, Jun., Rockhill, Broughty Ferry.

◆

The Postal Photographical Society.

ESTABLISHED 1882.

This Society has been founded for the benefit of amateurs, especially those situated in places where there are no local photographic societies, and as a means of affording them an opportunity of comparing their work with that of others, and of giving and receiving information on matters connected with the art. Intending candidates are now required to submit a specimen of their work previous to election. The Annual General Meeting for the election of officers, passing accounts, and other business, is held in June. Competitions are held from time to time in subjects announced in advance by the Committee; the collections of prints, forwarded for the purpose, are circulated among the members for votes and criticism.

President—Horace Day, M.D.

Committee—Horace Day, M.D., Harris Heal, H. A. Roome, M.D., and Walter Withall.

Hon. Secretary—W. M. Baylis, 3, Plowden Buildings, Temple.

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[*See Advertisements, pages* xix. *to* xxi.

Bolton Photographic Society.

ESTABLISHED 1879.

The Ordinary Meetings are held at The Baths, Bridgman Street, at Eight o'clock p.m., on the first Thursday in each month, from September to April. Annual Meeting on the first Thursday in October.

President—J. R. Bridson.

Vice-Presidents—E. N. Ashworth, R. Harwood, J. W. Hawksworth, and T. Parkinson.

Council—W. Banks, J. Taylor, W. Knowles, and J. Slater.

Treasurer—J. C. Sewell.

Secretary—C. K. Dalton, 50, Higher Bridge Street, Bolton.

◆

Halifax Photographic Club.

ESTABLISHED 1881.

Meetings held on the first Tuesday in each month, at the *Courier* Office, Regent Street, at half-past Seven o'clock. Annual Meeting and Election of Officers on the first Tuesday in October.

President—Rev. W. E. Hancock, M.A.

Vice-Presidents—Councillor John Smith and Thomas Whiteley.

Council—The Officers of the Club, with power to add to their number.

Treasurer—E. A. Caw.

Hon. Secretary—W. Clement Williams, 13, Akeds Road, Halifax.

◆

Bolton Photographic Club.

ESTABLISHED 1883.

Meetings are held every Tuesday Evening, at the Studio of the Club, Chancery Lane, Bolton, at Eight o'clock p.m.

President—Jabez Boothroyd.

Vice-President—Thomas Jukes.

Committee—Messrs. Hawksworth, Banks, Bradshaw, Ashworth, and Sewell.

Treasurer—John Bradshaw.

Secretary—James Slater, Town Hall Square, Bolton.

◆

Newcastle-on-Tyne and Northern Counties' Photographic Association.

ESTABLISHED 1881.

The Ordinary Meetings are held at the College of Physical Science, Newcastle, on the second Tuesday in each month, except June, July, August, and September, at half-past Seven o'clock. Annual Meeting in January.

President—Colonel F. F. Sheppee.

Vice-Presidents—Prof. A. Herschel, M.A., F.R.A.S., Prof. Bedson, D.Sc.

Council—Messrs. Downey, Dodds, Auty, Payne, Goold, Ridley, Sawyer, Galloway, Gibson, and Maling.

Treasurer—P. Maitland Laws.

Hon. Secretary—J. Pike, 43, Northcote Street, Newcastle-on-Tyne.

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[*See Advertisement, page* xxii.

Edinburgh Photographic Club.

ESTABLISHED 1881.

The Ordinary Meetings are held at 5, St. Andrew Square, on the third Friday of each month.

Board of Management.

Convener—Dr. John Thomson, R.N.
Treasurer—James Jameson.
Secretary—Alexander Mathison, 7, Arthur Street.

◆

Cambridge University Photographic Society.

ESTABLISHED 1881.

Meetings are held every Term at times appointed by the Committee; they are held in the Rooms of any Member who will read a paper on any subject connected with photography. The Society's premises are at 26, Lower Park Street, Cambridge, where there is a studio and dark rooms for the use of Members.

President—A. Scott, M.A. (Trinity).

Committee—The Rev. C. S. Chapman, M.A. (Emmanuel), M. Ogilvy, B.A. (Trinity), H. M. Elder, B.A. (Trinity), A. Kidd (Trinity), with President and Secretary.

Secretary and Treasurer—A. Hamilton (Christ's), Christ's College, Cambridge University.

◆

Bury Photographic and Arts Club.

ESTABLISHED 1882.

The Ordinary Meetings are held at the Temperance Hall, at Eight o'clock p.m., on the second Wednesday in each month. Annual Meeting on the second Wednesday in October.

President—W. S. Barlow.
Vice-Presidents—F. Cooper and E. W. Mellor.
Council—H. Dearden, J. J. Rishton, J. Shaw, A. Taylor, R. Grundy, Jun.
Auditors—W. Booth and T. Hutchinson.
Treasurer—John Nelson.
Hon. Secretary—F. W. Livsey, Victoria Terrace, Walmersley Road, Bury.

◆

Leeds Photographic Society.

RE-ESTABLISHED, 1882.

Ordinary Meetings are held on the first Thursday in each month, at Eight o'clock, in the Philosophical Hall, Leeds. Annual Meeting first Thursday in December.

President—Dr. Thorpe, F.R.S.
Vice-President—J. W. Ramsden.
Committee—Messrs. Branson, Bedford, Denham, Rodwell, Teasdale, Warburton, and the Officers of the Society.
Treasurer—J. W. Reffitt.
Secretary—Thomas W. Thornton, 22, Carr Road, Leeds.

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[*See Advertisements, pages* xix. *to* xxi.

Yorkshire College Photographic Club.

ESTABLISHED 1883.

The Ordinary Meetings are held at the Yorkshire College, College Road, Leeds, on the last Thursday in every month during College Session, at half-past Seven o'clock p.m. Annual Meeting on the last Thursday of the first month in the College Session. The whole Club forms a Committee for the transaction of business.

Treasurer—Herbert Ingle.

Secretary—H. B. Hall, 89, Caledonian Road, Leeds.

◆

North Staffordshire Amateur Photographic Society.

ESTABLISHED 1883.

The Ordinary Meetings are held at the Mechanics' Institute, Hanley, at half-past Seven o'clock p.m., on the first Wednesday in each month. Annual Meeting on the first Wednesday in November.

President—Charles Alfieri.

Vice-Presidents—F. J. Emery and T. Taylor.

Council—Messrs. Burgess, Hampton, Bradford Blackshaw, and Dr. Craig.

Secretary and Treasurer—W. B. Allison, 32, West Street, The Mount, Stoke-on-Trent.

◆

The Glossop Dale Photographic Society.

ESTABLISHED 1883.

The Ordinary Meetings are held at the Society's Rooms, Norfolk Square, Glossop, at Eight o'clock p.m., on the first Tuesday in each month. Annual Meeting on the first Tuesday in October, at Seven o'clock p.m.

President—Capt. Partington.

Vice-Presidents—J. Merry and S. Bamforth.

Council—H. Broadhurst, W. E. Rowcliffe, C. Greaves, T. S. Shaw, W. Rushworth, and all the Officers.

Treasurer—James Dalgleish.

Secretary—Benjamin Garside, Surrey Street, Glossop.

◆

St. Helens Association for the Pursuit of Science, Literature, and Art.—Photographic Section.

ESTABLISHED 1883.

The Ordinary Meetings are held at the Rooms of the Association, 4, Salisbury Street, at Eight o'clock p.m., on the third Wednesday in each month. Annual Meeting on the third Wednesday in July.

Chairman—H. Heather.

Committee—R. G. Brook, D. Thomason, T. Houghton, F. Morton, J. Taylor, T. Sherlock, and the Officers.

Treasurer—T. Crooks.

Secretary—J. F. Houghton, 44, Chapel Street.

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[*See Advertisements, pages* xix. *to* xxi.

Coventry and Midland Photographic Society.

ESTABLISHED 1883.

The Ordinary Meetings are held at the Coventry Dispensary, at Eight o'clock p.m., on the first Thursday in each month. Annual Meeting in November.

President—William Andrews.
Vice-Presidents—H. W. Jones, M. J. Danks, C. Ambrose, and A. Seymour.
Committee—T. Baynton, T. J. Lloyd, E. J. Walker, G. Winstanley, and the Officers.
Treasurer—C. Ambrose.
Secretary—Arthur E. Rollason, Hill House, Hill Street, Coventry.

◆

Burton-on-Trent and District Amateur Photographic Association.

ESTABLISHED 1883.

The Ordinary Meetings are held on the first Tuesday in each month.

President.—Rev. J. Bramell.
Committee.—A. Jones, S. Sims, and W. Jones.
Treasurer.—A. R. Siddals.
Secretary.—Horace E. Hunt, Branstone Road, Burton-on-Trent.

◆

Glasgow and West of Scotland Amateur Photographic Association.

ESTABLISHED 1883.

The Ordinary Meetings are held at 180, West Regent Street, Glasgow, at half-past Seven o'clock, p.m., on the second Tuesday in each month. Outdoor Meetings during the summer. Annual Meeting in December. Dark room for the use of Members and also for Amateurs visiting Glasgow, 180, West Regent Street.

President—Hugh Reid.
Vice-President—William Lang, Jun.
Council—John Parker, W. Snell Anderson, A. B. Ovenstone, A. J. W. Reid, James Elder, C.E.
Treasurer—Robert Cutting.
Secretary—George Murray, 31, St. Vincent Place, Glasgow.

◆

Blackburn Literary Club.—Photographic Section.

ESTABLISHED 1884.

The Conversational Meetings of the Photographic Section will be held in the Committee Room, at half-past Eight, on Monday evenings. The Sections of the Club are managed by the Secretary for each Section.

President—T. J. Syckelmoore, B.A.
Vice-President—Alf. Read.
Treasurer—Mr. J. F. Cooper.
Secretary—R. P. Gregson, Literary Club, Blackburn.

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[*See Advertisements, pages* xix. *to* xxi.

Birkenhead Photographic Association.

ESTABLISHED 1884.

The Ordinary Meetings are held, at half-past Seven o'clock, p.m., on the second Thursday in each month.

President—J. A. Forrest.

Vice-President—H. N. Atkins.

Council—A. W. Beer, A. W. Cornish, R. W. Hill, T. Cragg James, E. Newall, and P. H. Phillips.

Treasurer—J. Maurice Jones.

Hon. Secretary—John H. Day, 19, Milton Road, Birkenhead.

◆

Bradford Amateur Photographic Society.

ESTABLISHED 1884.

The Ordinary Meetings are held at the Free Library, at half-past Seven o'clock p.m., on the first Thursday in each month. Annual Meeting on the first Thursday in October.

President.—D. G. Law

Vice-President.—W. Townend

Committee—F. Illingworth, F. B. Muff, W. Townend, M. B. Wallace, J. Cotton, and H. Forsyth.

Hon. Secretary and Treasurer—G. D. Scorah, Leeds Road, Bradford.

◆

Derby Photographic Society.

ESTABLISHED 1884.

The Ordinary Meetings are held, at half-past Seven o'clock p.m., on the first Wednesday in each month, but subject to alteration by the Committee when desirable. Annual Meeting on the first Wednesday in December.

President—Captain W. de W. Abney, R.E., F.R.S.

Vice-Presidents—Charles Edward Abney, B.A., H. Arnold Bemrose, M A., and Richard Keene.

Committee—Arthur J. Cox, James E. Kaye, and Thomas Scotton.

Hon. Secretary and Treasurer—Fred. W. Simpson, Hamilton Villas, Mill Hill, Derby.

◆

Notts Photographic Association.

ESTABLISHED 1884.

The Ordinary Meetings are held at the Nottingham Institute, 9, Shakespeare Street, at a-quarter past eight p.m., on the first and third Monday in each month.

President—Mr. J. Shepperley.

Vice-President—Mr. A. Cox.

Committee—Messrs. Bourne, Byron, Collings, Dodd, Inger, Pendrey, Spray, Tuquet, and Townsend.

Treasurer—H. Sands.

Secretary—G. E. Inger, 7, High Street, Nottingham.

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[*See Advertisements, pages* xix. *to* xxi.

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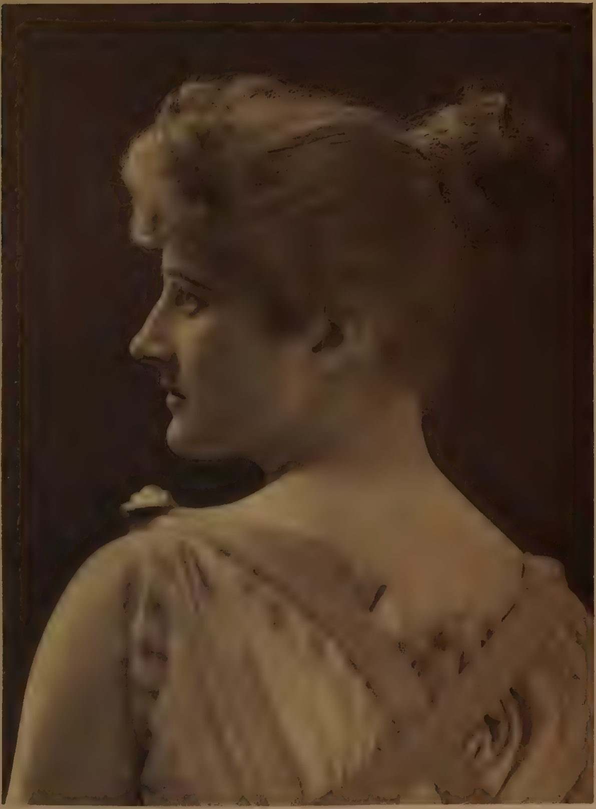

By the Van der Weyde light. *182, Regent street. W.*

MISS MARY ANDERSON

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BY MR. VAN DER WEYDE.

Photoglyptic print by Goupil and Co.

SUMMARISED NOTES OF PROGRESS DURING THE PAST YEAR.

BY THE EDITOR.

FEW of even the most sanguine among us could have dared to predict, even no further back than ten years ago, the broad strides photography would take in the next decade, and still fewer would probably have consented to recognise in the then new and little-noticed gelatino-bromide process the cause of the coming revolution. But events march quickly, especially in scientific matters, and in this present century of inventions it is impossible to foretell what a single year may bring forth. Certain it is that in the closing weeks of the year 1884 we find photography in a very different position, and with widely-different possibilities, as compared with ten years ago. Who knows but that the next decade may produce as great, or even greater, changes? It used to be the fashion, in summing up the events of the year, to state that photography had reached a state of stagnation—that the day of great discoveries was past. Yet, while we chroniclers were blandly uttering these platitudes, the greatest revolution that photography has ever known was silently, but surely, working its consummation; but not until nearly five years had passed did it burst upon an astonished world, which even then was reluctant to give itself up to the overwhelming tide.

Far be it from us then to complain of stagnation during the past year, simply because in our purblindness we fail to recognise anything in the light of a great discovery. Probably some of the work of the year may prove eventually to cause as great an upheaval as has the erst-neglected gelatino-bromide process, and we may, ten years hence, find ourselves as far ahead of the present as we now are of the decade that closed with 1874.

Certainly in connection with the gelatino-bromide process there can be no suspicion of stagnation. In almost every branch of the process important work has been done. In the mere manufacture of our sensitive films—though we by no means think finality has been reached—we have arrived at such a degree of perfection that it is difficult to imagine in what direction future improvements are to be made, unless, indeed, some startling scientific novelty shall spring up to change the whole current of our ideas. In the methods of using those films increased knowledge is continually being gained, and in development and the means and mode of lighting the developing room considerable progress has been made since the last year's summary was written. Then, again, in adapting the process to the production of the due relations of the colours when translated into monochrome some progress has been made, owing chiefly to the fact that the modern process lends itself more readily to the carrying out of the ideas of ten years ago.

In printing processes we have several improvements, chiefly in the direction of modifications of the gelatino-emulsion; and here it is probable that the next few years will see nearly as complete a revolution as we have already seen in negative work. Some attention has been given to our old friend the albumen print, with a view of rendering it more permanent, but in other existing processes little that is new can be recorded. In photo-mechanical processes considerable improvements have been made and great activity prevails, and the rapid spread of the employment of photography for this purpose promises to make this one of its most important applications in the future.

The optical lantern, both as a means of instruction and amusement, no less than as a direct aid to science, is also growing in popularity; and great efforts have been made not only to increase its efficiency, but also to remove some of the dangers which attend its use. In the matter of lantern slides, too, much interest has been evinced; and with the institution of a special prize for this hitherto-neglected form of photograph we have an additional incentive to their improvement. In this particular branch of work the old processes promise to hold their own for some time, especially the wet collodion and the collodio-albumen and collodion dry processes, though the gelatino-chloride plates already run them very close.

The immense influx of amateurs, as well as others, into the ranks of photography has caused a corresponding increase in the number of societies, and it is not too much to say that scarcely a week—certainly not a month—passes without the foundation of a new society in some part of the country. The names of the new ones during the past year will be found in the list elsewhere. Exhibitions devoted to photography are not only on the increase in number and popularity, but also show great improvement in quality. Several collections have been got together both in London and the provinces during the past few months, which would have been deemed impossible a few years ago. Next year, at the International Inventions Exhibition to be held at South Kensington, photography will hold an important position, having been honoured with a group or class to herself. It is to be hoped the art-science will show herself worthy of the distinction.

Death—with an account of whose progress it is customary to close this summary—has been unusually busy in our ranks this year, striking with unsparing hand at some of the best-known and most respected of our friends. Scarcely had the year set in when the death was announced of Mr. J. H. Dallmeyer, and then in rapid succession there disappeared from the roll such honoured names as those of the Rev. F. F. Statham, H. Baden Pritchard, F.C.S., and Jabez Hughes, while among the less known names of those who have gone are to be found Dr. Angus Smith, Messrs. F. A. Wenderoth, of Philadelphia, H. T. Anthony, of New York, Dr. J. J. Woodward, of the United States Army (so well known for his photomicroscopical work), and, finally, Messrs. J. Hubbard and J. L. Lane, of London—a list which will mark out the year 1884 as a singularly melancholy one. May we close by wishing our readers a brighter prospect in 1885!

ALKALINE DEVELOPMENT.

By the EDITOR.

BY far the most absorbing topic in connection with the practical working of gelatino-bromide plates during the past year has been development. The work of the past few years has resulted in such an improvement in the quality of the plates produced, both commercially and by private individuals, that general attention has been drawn away from the question of processes and formulæ, and is now directed towards the more practical manipulatory details of everyday work. Even here the tendency is rather to improve the methods of conducting the less important operations than to deal with the broader principles upon which the modern dry process is based—principles which the knowledge and experience gained by five or six years of constant practice have sufficiently established to enable the photographer of today to devote his attention more particularly to what may be termed the comforts or luxuries of working.

Chief amongst these are the arrangements of the developing room, which in their various phases have been the subject of much patient study during many months past. The question of illumination, not only from the point of view of mere comfort, but also from sanitary considerations, has received an amount of attention that has—it may be fairly said—effected a complete revolution in that department; and there is every prospect that in the matter of development and developing solutions a similar hygienic revolution will shortly be brought about.

Few operators whose duties necessitate their working for hours each day in the confinement of a not too spacious developing room, but have experienced the inconvenience, if not the actually injurious effects, of constantly breathing an atmosphere heavily charged with ammoniacal vapour, and which the most perfect system of ventilation is powerless altogether to cope with. The insidious effects upon the health of the constant respiration even in small quantities of this noxious atmosphere have been described and dwelt upon by more than one writer in the photographic journals; and there are at the present time numerous photographers who do not hesitate to lay to the charge of alkaline development various ailments from which they suffer. It is scarcely surprising, therefore, that a vigorous attempt should be made—if for sanitary reasons only—to find a substitute for the poisonous ammonia.

Ferrous oxalate, hydrokinone, and the recently-proposed hydroxylamine all offer a prospect of amelioration, so far as hygienic conditions are concerned; but unfortunately in practice they are none of them found to be so convenient, so manageable, and to present such valuable properties as alkaline pyrogallol. Hence it is that research has run almost entirely in the direction of the fixed alkalies in combination with pyro.—with what success may be judged by the fact that many operators have entirely discarded ammonia in favour of soda or potash with beneficial results. But the great majority still adhere to the old form of developer, with all its inconveniences, from some fancied inferiority in the results obtained with the newer mixtures, despite the fact that those who have already adopted the latter allege that they secure at least as perfect negatives as with ammonia. In fact there appears to exist an astonishing discrepancy of opinion as to the comparative effects produced by the different alkalies when employed in conjunction with pyrogallol.

If any one interested in the question—as who is not?—will take the trouble to tabulate the numerous formulæ, including soda and potash, that have been published, and will reduce them all to the same terms, he will no doubt be surprised at the remarkable variations in the proportions of the materials employed by different operators, varying as they do from below ten to upwards of thirty grains of alkali to each ounce of developer. This in itself would be sufficient to account for much of the discrepancy in results if we did not find occasionally two operators working the same formula—using even the same materials—and yet producing diametrically opposite effects. The latter is by no means an uncommon occurrence in photographic processes, so we may perhaps after all fall back upon the confusion of formulæ as the true explanation of the variable results obtained by different operators, and endeavour to discover exactly where the alleged discrepancies arise.

It seems only reasonable in comparing different developers that the comparison should be made under identical, or as nearly as possible identical, conditions as to strength. Now, the strength of a solution of alkaline pyro. may depend on various conditions, of which the quantity of pyro. itself present forms one. But naturally, in comparing two different alkalies, the proportion of pyro. used would be the same in each case. As to the alkali itself: its developing strength depends upon the degree of its alkalinity, which is widely differing weight for weight in different alkalies, while the variation is proportionately far greater when a caustic alkali like liquor ammonia is compared with a carbonated alkali such as washing soda. Add to this the use or non-use of a restrainer in conjunction with the two active constituents of the developer, and it will be conceded that there is plenty of room for the production of very varying results. Where these conditions of strength are made absolutely uniform, or at least as nearly as possible so, then there will be a chance of deciding whether the base of the alkali has any influence on the character of the development, or whether ammonia, soda, potash, or lime, is the best to employ. So far as we are aware no such accurate comparison has hitherto been made, and the following record of experiments is intended as a first contribution in a line of research which would occupy far more than the limits of this volume to thoroughly exhaust.

It was found to be desirable, if not absolutely necessary, to make two separate series of experiments, comparing in one set the caustic alkalies, and in the other the various carbonates. In each case the objects held in view were—first, quality and character of image; second, effect upon the sensitiveness of the plate; third, rapidity of action; and, fourth, comparative cleanness of working. Solutions were made in each group of exactly the same alkalinity; extreme accuracy being, however, scarcely necessary in actual practice, though it may be desirable in experimental work. In the case, however, of lime, as will be explained, it was impossible to make a solution of similar strength to the other alkalies. The quantity actually employed in the development was, however, made to agree in all cases.

In adjusting the strength of the various solutions a standard solution of oxalic acid was employed, this being for various reasons more convenient than sulphuric or hydrochloric, and the following substances were operated upon, namely:—Caustic ammonia, potash, soda, and lime—the last in the form suggested some years ago by M. Davanne under the name of "saccharate of lime;" otherwise, a solution of calcium hydrate in a syrup of white sugar. As a standard a 10·65 per cent. solution of ammonia was taken; that is to say, a solution containing by weight 10·65 per cent. of NH_3. Such a solution was found to result from the mixture of one part by volume of liquor ammonia s.g ·885 with sufficient water to make it up to three volumes, the mixture having a specific gravity of ·958 at 16° Centigrade. A solution of caustic potash of corresponding strength is formed by dissolving 35 parts of potassic hydrate to make 100 volumes of solution, which will contain slightly under 30 per cent. of K_2O, and be of the specific gravity of 1·240. Similarly, the soda solution is made by dissolving 25 parts of sodium hydrate to make 100 volumes, containing nearly 20 per cent Na_2O, and having the specific gravity of 1·2. The fourth solution was made according to M. Davanne's formula published in the ALMANAC of 1877, page 59. This consists of the following:—

Water	100 parts.
White sugar	10 ,,
Slaked lime	*quant. suff.*

Take a piece of quicklime the size of a walnut and, having "slaked" it, transfer it to a bottle containing the water and sugar; shake well at intervals during a few hours and then allow to settle. The surplus lime will serve to keep the solution saturated, and if the bottle be occasionally shaken the solution will remain of tolerably uniform strength for a long period. It should be observed that the lime must be slaked before adding it to the sugar, otherwise the heat evolved will probably crack the bottle. This solution contains as nearly as possible one grain of CaO in each fluid drachm, and it will be found by calculation that this represents but one-tenth of the strength of the other solutions—a result which closely agrees with that obtained volumetrically. Therefore, while the solution of ammonia, potash, and soda are of equal value, volume for volume as regards their alkalinity, in the case of the saccharate of lime ten parts or volumes must be employed to produce a developer of similar strength.

If any of the readers of the ALMANAC should be interested in repeating these experiments a word of warning may be given in connection with the figures quoted. The specific gravities of the various solutions have been given, except in the case of lime, when it would be of no value as a guide in consequence of the presence of the sugar. In the other instances, however, the specific gravity of the solution may be taken as a closely approximate guide to their degree of alkalinity. It must, however, be borne in mind that the percentage value of solutions, as given in the text-books, are the percentage values *by weight*, not by *volume*, and that, therefore, such tables would be misleading where the solutions are to be used by measurement. For this reason it has not been considered necessary to add the tables of the values of alkaline solutions of different specific gravities to those already standing in another portion of this volume. But when such tables are accessible it will be easy to calculate the percentage of alkali contained in a given volume of solution from the data there provided. If the solutions be made as has been directed, by dissolving a certain number of parts of the alkali to make one hundred parts or volumes of solutions, it is clear that the substance dissolved can be accurately divided by measurement. Thus, if 35 grains, by weight, of potassium hydrate (representing 30 grains as nearly as possible of potassium to oxide, K_2O) be dissolved in water and the volume made up to 100 minims or grain measures, each grain measure will contain three-tenths of a grain of real alkali.

A few words may be added in connection with the "parts" about which in some quarters very hazy ideas exist. In the course of an editorial article in THE BRITISH JOURNAL OF PHOTOGRAPHY a few week's ago it was pointed out that in consequence of the exceedingly anomalous character of our English weights and measures it is difficult in the extreme to carry to its full extent the simple method of stating chemical formulæ so general on the continent where the metric system prevails. In that system the cubic centimetre being the *measure* of one *gramme* by *weight* of distilled water the two terms are interchangeable and become synonymous with "parts." In our English system the units of weight and measurement are respectively the grain and minim, the latter being the fluid *measure* of one grain by *weight* of water, and they are thus similarly, though to a more restricted extent, interchangeable terms. But owing to the eccentric manner in which these grains and minims are grouped together to form drachms, ounces, pounds, fluid drachms, fluid ounces, and pints, it is next to impossible without a troublesome amount of calculation and measuring to make up a formula that is stated in parts.

It will never be possible until the metric system is introduced by law into this country to induce photographers to follow the example of chemists and adopt the metric units, the gramme and cubic centimetre; but, as was pointed out in the article referred to, they may, while still retaining the grain, minim, and units, enjoy the advantages in point of convenience of the metric system by altering the system of graduating their measures as well as their weights. Graduated measures can be obtained, the divisions of which run decimally, the unit being the minim, or, as it is called, the "grain measure;" while instead of the apothecaries' weights as at present used, consisting of scruples and drachms, or the avoirdupois ounce, half-ounce, and quarter, the weights represent units, tens, and hundreds of grains. Then the plan of stating formulæ in parts instead of "grains to the ounce" would be perfectly easy, while the conversion of a formula from the old to the new system, or *vice versâ*, would be a less puzzling task to many than the translation of grammes and cubic centimetres. It will be understood throughout this article that the quantities are given in parts which may be grammes and cubic centimetres, or grains and grain measures, at the option of the reader.

To return to the subject of development: We have so far dealt only with the caustic alkalies, and, before proceeding to the experimental portion of the subject, it remains to describe the solutions which form the second series of developers. Of the carbonates the only ones practically available, all of which have been pressed into service as developers, are the carbonates of ammonia, soda, and potash; these, however, exist in commerce in various forms, most of which have been tested with a view of deciding whether the question of purity exercises any appreciable effect on the results obtained. As a standard, a ten-per-cent. solution of washing soda has been selected, this being the most commonly employed form of alkali, and the solution, when diluted for use with an equal bulk of pyro. solution, approaches closely to the average strength of solution usually recommended, namely, twenty grains to the ounce.

It is necessary here to point out the wide difference that exists between the caustic and carbonated alkalies in their application, not only in matter of comparative strength, but, further, in the complications introduced in the latter instance by the presence of the carbonic acid. In addition to the proportionately higher value of the alkalies in the free or caustic state, their higher degree of solubility renders it possible to have far more concentrated solution; such, in fact, as may be used, as is customary with ammonia, in minims. Such are the solutions we have already described, but not so in the case of those still to be spoken of.

In estimating the relative alkalinity of the two classes of solutions it is plain that the quantity of standard acid required to neutralise a given volume of solution of caustic alkali is a direct measure of its effective value; but the same is not true when we come to deal with the carbonates. Carbonic acid is a dibasic acid—that is, it forms two series of salts containing different proportions of alkali; the normal or alkaline carbonate, of which washing soda may be taken as the type ($Na_2\,CO_3$), and consisting of one atom each of sodium oxide ($Na_2\,O$) and of carbon dioxide (CO_2); and the acid or bicarbonate ($Na\,H\,CO_3$), in which an atom of metal is replaced by one of hydrogen. Carbonic acid is readily displaced from its combinations by the stronger acids escaping with effervescence in the form of gas, but a small portion of which remains in solution. When sulphuric or oxalic acid is added in excess to a caustic alkali in solution it combines without effervescence, and the exact point of saturation is marked by the change of colour of litmus or turmeric. But if the same acid be added to a solution of the normal sodium carbonate its alkaline reaction disappears before it is nearly saturated—that is to say, before the whole of the carbonic acid has been displaced; hence in this case the quantity of acid employed is not a direct measure of its alkalinity.

The change that occurs may be thus expressed: an atom of oxalic acid displaces one of carbonic acid, which in its turn combines with another atom of normal carbonate to form acid carbonate thus:—

$$\begin{array}{ccccccc} \text{2 Atoms Sodium Carbonate} & + & \text{1 Atom Oxalic Acid} & = & \text{1 Atom Sodium Oxalate} & + & \text{2 Atoms Sodium and Hydrogen Carbonate.} \\ 2\,Na_2\,CO_3 & + & H_2\,C_2\,O_4 & = & Na_2\,C_2\,O_4 & + & 2\,Na\,H\,CO_3 \end{array}$$

In this condition the solution ceases to give an alkaline reaction—in fact, turns the blue colour of litmus to violet. If it be boiled, however, the acid carbonate is decomposed, the carbon dioxide escapes, and the blue colour returns to be again discharged by the addition of more acid until, by alternate additions of acid and the application of heat, the whole of the CO_2 is displaced and the colour becomes bright, red, and permanent.

In estimating the alkalinity of a carbonate and its consequent developing power it is necessary to note the point at which the first atom of the base is neutralised, for then, though the solution will still go on reacting with the stronger acid, it will have ceased to be alkaline. This point is perhaps more readily recognised if turmeric be used as the test instead of litmus, for it is difficult to judge exactly when the violet colour changes to decided red. With turmeric, however, the instant the point of neutrality is passed the brown colour is discharged, carbonic acid possessing the same power in that respect as the stronger acids, and not producing an intermediate colour, as in the case of litmus.

As a developer, then, a carbonate is proportionately far less energetic than a caustic alkali; indeed, it is not unreasonable to regard it as a developer *plus* a restrainer. If we look at the solution of normal carbonate in the light of a mixture of sodium oxide and acid sodium carbonate—$2\ Na_2\ CO_3\ H_2\ O = Na_2\ O + 2\ Na\ H,\ CO_3$—the latter of which has been shown to be a powerful restrainer, the relative value of the carbonates as developers becomes clearer, and their behaviour as compared with the caustic alkalies is explainable.

The following carbonates have been tried, and it will simplify the explanation if the strength of the various solutions is given in tabulated form :—

No.	Name.	Formula.	Equiv.	in 100. Parts
1.	Carbonate of ammonia........	$(N\ H_4)_2\ CO_3$	= 96	3·25
2.	,, soda (anhydrous).	$Na_2\ CO_3$	=106	3·75
3.	,, ,, cryst., pure..	$Na_2\ CO_3 + 10\ H_2O$	=286	10
4.	,, ,, washing soda	,,	=286	10
5.	,, potash, pure anhyd	$K_2\ CO_3$	=138·2	4·75
6.	,, ,, cryst.	$K_2\ CO_3 + 2\ H_2\ O$	=174·2	6
7.	,, ,, and soda ..	$KNa\ CO_3$	=122·1	4·25

These quantities are the nearest approximate figures that can be given without resorting to awkward fractions, but in our experiments the solutions were, for the sake of accuracy, carefully titrated to one uniform strength. The anhydrous salts were thoroughly dried at a temperature short of ignition; the hydrated salts were dried over sulphuric acid in a water oven.

Where not otherwise stated the pyrogallol was employed of the uniform strength of three grains to the ounce of finished developing solution ; that is to say, a three-grain solution was employed with the caustic alkalies, the latter being added in minims, and a six-grain solution mixed in equal volumes with the carbonate solution. In the case of lime the necessary quantity of dry pyro. was added to the diluted saccharate. In all cases the developers were tried first without any addition beyond pyro., alkali, and water; second, with the addition of restraining bromide of potassium; third, with the addition of sulphite of soda; and, fourth, with the addition of both bromide and sulphite.

In proceeding to give an account of the comparative results it would be quite impossible to give anything like a detailed account of the numerous experiments which have been spread over several months ; these will probably be described elsewhere. Here it will only be attempted to give the general conclusions arrived at under the various conditions stated above.

In the first place, before proceeding to development, the action of the various alkalies upon plain pyro. solution was noted, and as their relative behaviours in this direction have an immediate bearing upon the results they give as developers the following experiment may be quoted. Into a number of test tubes of uniform size let measured quantities of pyro. solution be placed, and to this let there be added equivalent quantities of the respective alkalies. It will be found that the rapidity with which the solutions oxidise or discolour varies very remarkably, and here we have an important element in connection with the cleanness of development. Thus, with the caustic alkalies we find that on adding a minim or two of the soda solution, with a slight shake to thoroughly mix it, the whole solution immediately takes a peculiar purple-brown tint which darkens rapidly, losing its purple colour until, in two or three minutes, it becomes quite opaque. The saccharate of lime strikes instantly a brown colour throughout, but does not darken so rapidly as soda; while the colouration of the potash mixture is similar in character to that of soda, but the darkening still more slowly. In the case of ammonia the primary colouration is paler than in the other instances, and the darkening very much slower; indeed, the ammonia solution does not entirely lose its transparency for an hour or two.

In all these cases the darkening goes on uniformly throughout the whole bulk of solution, but such is not the case when we turn to the carbonates. If these be compared in a similar manner by mixing equal volumes of each of the various carbonates with a like bulk of pyro. solution the same instant discolouration occurs, but much more faintly a pale straw-colour in the case of ammonium and potassium carbonates, and a stronger tint in the case of sodium being produced. But the subsequent behaviour of the mixtures is characteristic; while the same order as regards rapidity of darkening prevails, the manner of discolouration differs entirely from that of the caustic alkali. Thus, if the test tubes are allowed to remain stationary, it will be found that a dark cloud first forms on the surface of the liquid, and this gradually darkens and spreads slowly downwards into the liquid as the oxidation proceeds, the lower stratum of liquid retaining its original tint for a very long time. This fact shows in an interesting manner the preservative action exerted by carbonic acid in preventing discolouration of the pyro. solution, and explains why the carbonates may be employed without any restraining bromide. The latter added to either of the caustic alkalies will cause it to behave in a similar though not so marked a manner. Therefore, it would seem that the acid sodium carbonate —as recommended by an Edinburgh gentleman some time ago—should be more efficacious in preventing fog than is bromide, and under certain conditions experiment seems to fully confirm this.

The first set of experiments consisted in comparing the different developers without any addition of bromide or sulphite. So far as the caustic alkalies are concerned the trouble might have been spared, as the results were utterly discouraging, ammonia being the only one of the four that gave an image with any semblance to utility. The exposures were made under standard sensitometer conditions in all cases, but so far as the group of solutions is concerned, the details of results may be reserved. Turning to the carbonates: the best results as regards quality were undoubtedly those given by Nos. 5 and 6, carbonate of potash, next coming No. 7, the double salt, then Nos. 2, 3, and 4, carbonate of soda, while ammonium carbonate, from a strong tendency to fog, produced the worst results. It should be observed that none of these results were as regards quality—*i.e.*, vigour and clearness of gradations—what we should consider first-class, though as regards cleanness there was little fault to find except in the case of ammonia. In this group of trials, as in all others, no appreciable difference could be detected between the results produced by the different samples of potassium and of sodium carbonates. It does not, therefore, appear necessary to resort to the use of the higher-priced pure preparations.

As regards sensitiveness there appeared to be no difference. While all the plates showed distinctly No. 20, the carbonate of potash appeared to give 21 very plainly; but this was most probably only due to the fact of the film being clearer than in the other cases. In rapidity of action the soda solutions took premier position, ammonia coming next, and after it the double salt, carbonate of potash being slowest of all. For cleanness the order was potash, potash and soda, soda, and, finally, ammonia. The soda image, however, showed a faint *stain*, but no fog, as in the case of ammonia.

We next tried the effect of the addition of bromide of potassium. The best result of the first set of experiments was given by ammonia, potash coming next, only slightly inferior from being weaker—soda being not only much weaker still, but giving a good deal of fog as well as stain. The saccharate of lime was altogether out of the competition. As it stained the film so badly, and as it was impossible to improve matters by adding sodium sulphite or sulphurous acid, it was dropped out of the experiments at this point. By increasing the proportion of bromide with the potash and soda developers better results were obtained; indeed, potash in quality was quite equal to ammonia, though a longer time was involved in the attainment of the result. In sensitiveness, practically ammonia took first place, as with a given exposure it produced a clean vigorous image and a higher figure than the others. If the same degree of strength to a certain number on the sensitometer were obtained with potash or soda, the image became foggy and of bad quality. In rapidity of action the order was soda, ammonia, potash; and in cleanness, under normal conditions, ammonia, potash, and soda. If, however, forced development was resorted to—that is to say, under conditions of under-exposure—potash took the first place, ammonia showing signs of green and soda of grey fog, while potash remained comparatively clean.

Amongst the carbonates that of potash gave the best result, ammonia next, with but little difference among the rest and no difference at all in practical sensitiveness. Carbonate of soda brought up the image with greatest rapidity, though in this it was almost equalled by ammonia. The best result in the whole series with the addition of bromide was that produced by caustic ammonia, carbonate of potash coming next. The latter, if used stronger than the normal strength adhered to in the general experiments and with a proportionately larger increase of bromide, gave an image not inferior to that produced with ammonia; but it required a much longer time in development.

The comparative results obtained when sulphite of soda was employed do not vary greatly from what has already been recorded. While the colour of the image was in all cases changed by the addition, the only instance in which it could be said that any advantage accrued to one solution rather than to another was in the case of soda, and of sodium carbonate in their respective classes. But the gain to soda was not sufficient to place it in any better position with regard to its rivals. As the value or otherwise of the addition of sulphite of soda appears to be chiefly a matter of taste we shall not attempt to draw any comparisons between the results obtained in this group and those in which the sulphite is not employed beyond saying that, whereas personally we have a strong predilection in favour of sulphite, few even of those who decry its use will deny the advantage it confers in connection with soda.

On some other occasion the results will be given of experiments made with carbonic acid and the acid carbonates as restrainers, retarders, and preservatives. Here alone is a field of research possessing an amount of interest to engage the careful attention of the experimentalist for a considerable time, but space prevents its treatment here. In the course of a few weeks, probably, in the pages of The British Journal of Photography, we may return to it.

In conclusion: the result arrived at from probably several hundred experiments made under specified conditions is that liquid ammonia still holds its position as premier developer; but that if it be necessary or desirable to relinquish its use on hygienic or other grounds it is run very close, even under the restricted conditions under which these experiments have been conducted by the carbonates of potash and soda. At the same time it is to be borne in mind that it by no means follows that these conditions are the most suitable; indeed, some of the experiments quoted show clearly that they are not, for by altering the proportions of carbonate of potash we are able to make it equal ammonia in the quality of its result. So by other modifications it is possible that sodium carbonate, which hitherto has been the favourite, and is the most convenient developer, may be made to excel the rest. This, however, must now be left to individual experiment. One thing seems pretty certain, however, namely, that the caustic alkalies, with the exception of ammonia, offer little prospect of advantage.

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PHOTOGRAPHY BY ELECTRIC LIGHT: THE YEAR'S RESULTS.

By J. W. Swan, M.A.

I wish I could report to those readers of the Almanac who are interested in the application of electric light to photography that the year just passed has brought forth some great achievement in the way of simple and inexpensive electric light production. I wish I could describe some new and easily-constructed battery that would enable a photographer to obtain the ten- or twenty-thousand candle-light for the few seconds he requires it, with less trouble and at less cost than was possible before. Alas! the year has not been bountiful in this respect. There is absolutely nothing new of value to the photographer in connection with the chemical production of electricity.

There is, perhaps, some development in the details of construction of large batteries adapted to the production of the powerful current demanded by a large electric light. It is at least possible to procure such batteries by purchase, and this was not the case two or three years ago. A battery that would give the necessary large and sustained current for a really large electric light was, up to within the last year, a very uncommon piece of apparatus. Now, there is no difficulty in obtaining a battery that will feed a twenty-thousand candle light, and at much less cost than formerly, owing chiefly to the fact that large carbon plates and large earthenware cells are now regular articles of manufacture. There is also amelioration of the cost and convenience of maintaining the battery in a state of action. But, even with these changes in the right direction, the battery is hardly yet in a condition to render much service to the photographer. Where a photographer determines to seriously "go in" for electric lighting there is practically still nothing for it but the dynamo and the gas engine.

What I have said as to the year's results in respect of the voltaic battery, I must repeat with reference to the dynamo and gas engine. There is no very *wonderful* improvement in either of these machines, but *they have both been improved.* The dynamo has been improved in such a way that a smaller machine now does what a larger one was required to do before, and consequently the cost of the machine is less than it was. The gas engine has been made to work more steadily by the device of coupling the pistons of two engines to one crank axle, and it has been made more manageable by the addition of self-starting gear. With a pair of three-horse-power coupled engines with self-starting gear, and a corresponding dynamo, a light of ten to twenty thousand candles is obtainable, and less than that is not of much use for portraiture. The only feasible alternative—and that one of doubtful advantage—is to employ an engine and dynamo of smaller power, together with a set of secondary batteries of large size, the engine and dynamo to be kept working with sufficient continuity to maintain the battery fully charged, and thus enable it to give out, during the short space of time for which the light may be required for taking a portrait, a current five or ten times as powerful as the dynamo and engine alone would be able to produce.

That electric light is sufficient to enable the photographer who knows how to use it to produce good work is now abundantly evident. Visitors to the recent Photographic Exhibition could not fail to be struck by Mayall's electric light portrait of the President of the Photographic Society of Great Britain. Anything more perfect as a portrait or as a photograph it is impossible to imagine.

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CERTAIN PROPERTIES OF SIMPLE LENSES.

By J. Traill Taylor (New York).

It is probable that, in a far more pronounced degree than has hitherto been the case, single lenses will assert for themselves a high position in the optics of photography. By "single" lenses I here mean just what the term implies, namely, one piece of glass ground in the form of a lens pure and simple, as contra-distinguished from a single achromatic lens, which is formed of two elements.

One leading feature in single lenses—and it is an all-important one in photography—consists in their inability when employed, any one by itself, of forming an image which in the photograph will be as sharply defined as was the image visible upon the ground glass. This arises from the non-coincidence of the visual and the chemical foci—a subject upon which it is not necessary here to dwell. But when a single lens is employed with discrimination, it may be made to produce pictures that shall not be deficient as regards sharpness.

By way of making this understood—more especially by those who have become acquainted with photography since those days, now long departed, when the functions of single, uncorrected lenses formed a theme of discussion among the fraternity—I will narrate an instance of what took place immediately previous to the writing of this article. Having obtained from a dealer in meniscus or periscopic lenses—ground for the purpose of aiding vision when mounted in spectacle frames—one having a focus of fifteen inches, with a diameter of one and a-half inch, it was mounted in a short tube with a stop of a quarter-inch aperture placed at a distance in front nearly equalling the diameter of the lens. Having obtained a sharp focus on the ground glass, the lens was then pushed nearer to the focussing-screen by the extent of half-an-inch, which had the effect of throwing the image out of visual focus. But upon exposing a plate—one of 8 × 5 dimensions being employed—the image was found to be exceedingly sharp all over, and it was apparent that a larger plate could have been well covered.

Now all this is, or in olden times was, well known to the early fathers of photography, and it is here narrated for the purpose of enabling the more modern reader to understand what is to follow.

If two such lenses as that spoken of be employed instead of one only, and if these be mounted one at each end of a tube, convex sides out with a stop in the middle, certain modifications of the resulting image takes place. The ray from the lens to the sensitive surface will emerge from the objective in a direction parallel to that at which it entered, and this parallelism forms the condition by which freedom from distortion is obtained, the lens being strictly rectilinear. A second change which has been induced by this duplicating of the lens consists in obtaining more perfect correction of all the oblique pencils, and, in consequence, a higher degree of refinement in the focus of these pencils ensues.

But there is still a discrepancy between the two foci—the visual and the chemical; and, although there is an improvement in this respect as regards the oblique rays, those which are axially transmitted are proportionately as far apart as before. In proportion, however, as the curves of the lenses are deepened so is this distinction rendered less apparent, until at length a point is reached, owing to the deepening of the curves, at which such a compromise is effected as to produce no sensible difference between the visual and chemical focus.

Whatever faults may be inherent in a wide-angle lens of the simple form indicated, they are eliminated by making a compromise between the achromatising of both lenses and leaving them single. A deep achromatic meniscus front, when united to a single and moderately-deep meniscus back lens, forms an objective which works sharply to visual focus even when there is no over-correction in the front lens. Why such an anomaly should exist need not here be explained; it is sufficient that the fact be noted.

It has been shown that, when single lenses formed of crown glass are added to others which have been achromatised for the purpose of correcting some of the distortions that would inevitably be produced by the achromatic if employed alone, there is no necessity for having others than those formed of crown or plate glass alone. The fact has been placed on record that in a triple combination like that of Mr. Thomas Furnell many changes in focus and in securing corrections which would practically revolutionise the objective have been effected by the addition of simple spectacle glasses carefully selected, the ultimate sharpness in every case being as good as it originally was.

To one property more in a single lens I will allude before closing. I have said that when such a lens is made use of alone it has to be pushed nearer to the focussing-screen in order to ensure sharpness in the chemical image. Here is a method by which this may be mitigated. Let the focussing be performed with a stop of large aperture, and then insert a small stop for working with. In the case of some single lenses the substitution of the smaller for the larger stop will effect such a lengthening of the blue rays as will project them to the plane upon which was received the visual rays when transmitted through the agency of the larger aperture.

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SUGGESTIONS FOR THE PHOTOGRAPHIC REGISTRATION OF STAR TRANSITS.

By G. M. Whipple, B.Sc., F.R.A.S.

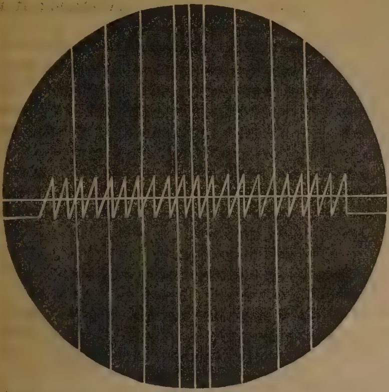
Superintendent of the Kew Observatory.

Astronomical photography is now making rapid strides in the hands of Mr. A. Common, Dr. Huggins, and others. Professor Young, in his recent address to the American Association for the Advancement of Science, recommending its farther employment in astronomy, said:—"Photography comes continually more and more to the front; and the idea sometimes suggests itself that by-and-by the human eye will hardly be trusted any longer for observations of precision, but will be superseded by an honest, unprejudiced, and unimaginative plate and camera."

The above will be my excuse for troubling you with the following suggestion. Since we have organised at the Kew Observatory, Richmond, a system of rating watches for manufacturers and the public, my attention has been constantly directed to the determination of the true time with greater accuracy than has hitherto sufficed for the ordinary work of the Observatory. Seeing that automatic registration is so useful in many branches of science pursued here, I have contemplated its application to transit observations; but as yet have had no opportunity of reducing my idea to practice and constructing the necessary apparatus.

At the Royal Observatory, Greenwich, and in several other places, transits are recorded by the chronographic method, which, in addition to being subject to mechanical defects, is affected by a variable source of error in the nervous condition of the observer.

The plan I would adopt is the following:—A camera should be attached to the eyepiece of a transit telescope, in the same manner as in a photoheliograph, and a clock train adapted to it so as to cause the sensitised plate to move up and down through a small space every two or three seconds. If, then, the starting movement and stopping of the clock train be controlled electrically by the standard clock, on developing a plate after the passage of a star across the field of view of the transit instrument something like the figure will be obtained. The vertical lines represent the suitably-illuminated wires in the field of the instrument, and the zigzag line will be the trace of the star's motion, each peak of the zigzag indicating the position of the star at a given instant of time, the whole affording a series of observations from which the true time of the star's crossing the centre wire or meridian may be determined with great accuracy. Of course the time at which the clock train comes into motion and ceases must be noted by the observer, who, in addition, will have to make the ordinary determinations of level, azimuthal and collimation corrections, and apply them to his results.



Registration of Star Transits by Photography.

The apparatus presupposes the possession of plates sufficiently rapid to fix the image of a star in transit. Probably with a telescope of sufficiently large aperture it might be done with existing plates, but want of time has prevented my hitherto making experiments.

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A DARK LANTERN.

By R. L. Maddox, M.D.

The following description of a plan for adapting an ordinary dark lantern into one useful for development in the dark room may possibly be of service to others. The lantern is of the flat form, well made, about five and a-half inches high by four inches wide, and one and three-quarters of an inch deep, and is provided at the back with a door having an attached silvered reflector and folding handle. In front it is closed by a plain glass plate having an outside flap, hinged at the top, to close downwards. The oil receptacle is movable and steadied by fixed side guides.

The additions made to this really useful pattern lamp for photographic purposes are simply the fixing of a piece of red paper—that used by some manufacturers for enveloping their dry plates—by means of varnish coloured red on the outside of the flat glass plate, and a light frame of tin attached by loop hinges soldered to one side of the lamp, top and bottom, and secured by a long wire pin that passes through the loops. This frame is glazed with orange-coloured glass, and can be removed at any time for packing if required.

For use the lamp is placed in a considerably larger-coverless wooden box set on end, and supported at a convenient height for work. This is to prevent any accidental sidelight leakage. The hinged flap moves stiffly, so that when raised to an angle for reflecting the light upon the plate it remains in that position. A piece of red paper cut a little larger than the front glass is, when needed, made to rest against it. There would be no difficulty in making the additional frame hold two coloured glasses or in using coloured glass for the fixed front plate, if desired.

◆

ON THE PHOTOGRAPHY OF PAPYRI.

By Dr. Aug. Eisenlohr (University, Heidelberg).

In overcoming difficulties consists the progress of art, and difficulties are numerous in every branch of photography. Not insignificant are those encountered in the photography of papyri.

Papyri! What are papyri? Many of your readers will know it, and several not. Papyrus is the material which was generally written upon in antiquity. What kind of antiquity? The antiquity several thousand years before Christ till some hundred after Him. Papyrus has been fabricated from the interior parts of papyrus plant's tissue—a plant called by science *Cyperus papyrifera*, to be distinguished from grass by its triangular sharp-edged stalk. Nearly all books in antiquity were written on papyrus, but most of them have been destroyed. In Egypt alone, on account of the excessive dryness of the air, they have been preserved. They were found there in tombs and recesses, sold to travellers and brought to the different museums of Europe—the British Museum in London, the Louvre and the National Library in Paris, to Turin, Leyden, Berlin, &c.

By far the greatest bulk of these papyri are written in the different Egyptian idioms—the hieroglyphic, the hieratic, and the demotic. Some of them are written in Coptic, a good part in Greek and in several other languages—Latin, Arabic, Hebrew, Pehlewi, &c. They supply a really inexhaustible source and treasure for the investigation of antiquity—especially the Egyptian language in its consecutive epochs. To use papyri for purposes of study it is necessary to have them published in a fit manner—that is to say, quite resembling the original. Copies by hand are valuable only when made by one well acquainted with the language, and even then they are still liable to many faults. Tracing is a better plan, but useless for a scribbled and small handwriting in a half-unknown language.

Thus the last resource is photography—the best way of all, but surrounded by many difficulties just in that special application. First comes the struggle with the director and the officers of the museum. Not so in England, where the enlightened keeper of antiquities in the British Museum—fully understanding the duties of a conservator of literary treasures, and not retaining them for his own studies, but communicating them liberally to the scientific world—not only published at the museum's expense the photographs of some important papyri, such as the *Ritual of Hunefer* and the large papyrus of Nebseni, but readily meets the wishes of scholars desirous of having photographed copies of papyrus. He liberally offered me a studio where I could photograph every papyrus of the museum I liked. So it is in France, where, on the motion of Baron de Watteville, in 1877, a ministerial order was issued granting under certain conditions the privilege of photographing every object in the museums. But I found difficulties first at Berlin, where the renowned director of the museum and my colleague, the late Professor Lepsius, refused my request to photograph some papyri of the museum; and at Leyden, where the director, Dr. Leemans, restricted the permission of photographing to such objects which had been published before; while, when the congress of orientalists assembled at the same time at Leyden, they required unanimously from the British Museum the extradition of valuable manuscripts to scholars abroad. Again at Turin, where the director, M. Fabretti, and M. Lanzone impeded my operations in every manner, not allowing me to take down the papyri from their hinges or to move a table for getting the necessary room for focussing, so that I was obliged to recur to the authority of the excellent director-general of the museums of Italy, Senator Fiorelli; at Rome, where neither the recommendation of the Prussian Ambassador nor the agreement of the director induced the maggiordomo of his santita to grant the desired permission to take photographs in the Egyptian gallery of the Vatican, notwithstanding that it had been done several times before. In the Bibliotecia Vaticana they could not find the Greek papyri, published by Bernard Peyron. At these circumstances it is no wonder that the results of my photographic journeys were far from being satisfactory, but "experience is the mother of wisdom." I am confident that even my failures may prove of some help to those interested in the same subject. Let me, therefore, mention some observations I made in my excursions to Leyden and Turin.

Although the size of my plates is only 8 x 10 inches I required a considerable bulk of luggage, nearly ninety kilos, which not only augmented considerably the travelling expenses but also hampered my quick advancement. Arriving early in the morning at Mayence to take there the steamer for Cologne, with my heavy luggage I could not reach it in time, and after having seen it steaming away I had to wait hours for the next. The customs officers I found very civil not only at the entry to Holland, where they left my parcels unopened, but also in Italy, on the steamer at Lago Maggiore, where they were awfully impressed by my explanation of dry plates not being allowed to be exposed to light. The transport from railway to steamer, or *vice versa*, is always troublesome, and causes, especially in the south, some altercation with insolent porters. My boxes were damaged in going and coming back, necessitating a thorough repair.

Now to the work. In both places, at Leyden and at Turin, my subjects, the papyri, were placed in galleries of the museums not perfectly obscure, but dimly illuminated. At Leyden, after a faultless attempt inside the gallery, I brought the papyri into the open court, where, with a clear sky, I obtained some good negatives with an exposure of from a half to two minutes with Simeon's plates (which have three-fifths of the sensitiveness of Monckhoven's). The ruggedness of some papyri, which rendered the wrinkles clearer than the writing, proved a serious obstacle, the yellow colour of the papyrus material being not so obnoxious when the shade of the yellow was light and not brownish. Still I think that the new orthochromatic method of treating the plates with eosine, azaline, or cyanine will be of great use for rendering the yellow colour of the papyri less prominent than now with ordinary plates. Generally, I believe that for this special kind of photographic work the wet collodion process is still preferable to the dry gelatine process. This I must confess in spite of my own fancy for dry gelatine plates.

It is a well-known, though not sufficiently explained, fact that the difference between light and shade in the original is much exaggerated on gelatine plates, so that it is nearly impossible to get a good copy from a manuscript which has clearer and darker parts. Collodion plates give the details better than gelatine, which is of great importance in the scrawled handwriting of papyri. But the use of wet collodion is often impracticable in museums, and its application sometimes forbidden, as in the Louvre. The time required for taking a good negative in a dimly-illuminated interior is too long to keep the collodion wet. However, I was told by Mr. Martelli, of Rome, who is one of the ablest artists in that branch, that he makes exclusive use of collodion plates in his work in the library of the Vatican. In the museum at Turin I was forbidden to take down the papyri hung high up on the walls, so I had to make use of elevators of nearly ten feet high. For my heavy objective I had a separate stand, and the camera was drawn out to more than three feet. It was very hard work, and produced the effect of a Turkish bath to get all clearly in the right focus.

The handwriting of papyri being generally small it is advisable to make the plate the same size as the original. Therefore the camera must be drawn out to an excessive length. I used Dallmeyer's rapid rectilinear of nineteen and a-half inches focus for plates 10 × 8. Being obliged to leave the papyri in their places I suffered all the disadvantages of their situation, the dim and irregular illumination, the slope of their position, and the narrowness of the passages between the tables. No wonder that the time of exposure was very long. For a good plate I required at the best time of the day, with the blue sky of an Italian April sun, not less than an hour for Monckhoven's and an hour and forty minutes for Simeon's plates. The development was performed in my bedroom at the Hotel Feder, not without sometimes being annoyed by persons wishing to come in, or by the gas-lamp being lit before my door.

For the publication of papyri I do not recommend copies on silvered paper; they are too expensive and endanger the negative. Two good methods are the dusting-on and the autotype processes. The best I ever saw were made by the above-named Martelli with a process called by him "Eliotipia."

In general I found that the execution of my plans for taking photographs of papyri in museums involved much greater difficulties than I had anticipated.

THE BICHROMATE DISEASE AND ITS TREATMENT.

By E. W. FOXLEE.

DURING the last year or two Dr. B. W. Richardson, M.A., F.R.S., &c., has brought before the medical world what he designates as a new disease—"The Bichromate Disease." As I am somewhat at a loss for a subject as my contribution to this year's ALMANAC, and being, unfortunately, too familiar with this disease—not particularly *new* to me—I propose to offer a few remarks on the treatment which I have found most beneficial in my own case, and in the case of others to whom it has been recommended. Dr. Richardson, when alluding to the treatment of the disease, remarks that he doubts if *any* treatment is of much avail, but that recovery commences when the cause is withdrawn and nature follows her own course. In face of so eminent a medical authority it is not to be supposed that I should be able to impart much information of value. However here it is, a layman's opinion, and for what it is worth.

The first symptoms of the disease, I may say, is a violent irritation of the skin between and on the backs of the fingers. When these symptoms first make their appearance all further operations in which the bichromate is employed should be conducted in india-rubber gloves, otherwise the disease will gradually extend over the backs of the hands and on to the wrists. At the early stage of the disease the best treatment I have found is to apply, at bedtime, to the affected parts a little strong nitrate of mercury ointment—the *unguentum hydrargyri nitratis* of the pharmacopœia. This should be well rubbed into the skin. A little alkaline cooling medicine should also be taken, and alcoholic drinks avoided, or anything else that has a tendency to heat the blood, as this increases the irritation. Scratching the affected parts should be strictly avoided—a difficult thing to do, I admit, but it should be done. To allay the irritation a cooling lotion should be applied. Dr. Richardson recommends a solution of the sub-acetate of lead. This I have found very beneficial, but, unless the skin be much cracked or chapped, I much prefer a dilute solution of carbolic acid in alcohol, the suggestion for the use of which I am indebted to our worthy Editor, Mr. W. B. Bolton. After using this lotion for a few times I found it to leave the skin in a very dry and harsh condition. To obviate this I added with advantage a little glycerine. The formula I now recommend stands thus :—

Alcohol	5 ounces.
Pure crystallised carbolic acid	40 grains.
Glycerine	4 drachms.

The effect of this lotion in allaying the irritation, even in an advanced stage of the disease, is really surprising, and I can with confidence recommend it to all sufferers. Carbolic compounds generally appear to be more or less efficacious, for, some years ago, the late Mr. J. A. Spencer recommended the liquor carbonis detergens diluted with water as a lotion. Some time back the Editors of THE BRITISH JOURNAL OF PHOTOGRAPHY gave me a sample of soap, which a correspondent who suffered from the disease had forwarded for trial, saying it was the best remedy he had tried. I tried it and also found it good. It was a carbolic soap—evidently an oil soap—and it rendered the skin very supple, as well as allayed the iritation.

My experience of the disease, and from what I have seen in others, is that it takes a very long period of constant working at carbon printing before any ill effects are produced. But when once the disease has got a fair hold—although, if further contact with the bichromate be avoided, nature soon cures herself—the disease is always liable to make its reappearance whenever operations are resumed with the naked hands.

A large proportion of carbon printers, I know, have never experienced any ill effects from the bichromate, and my impression is that in the major proportion of cases the disease might, with ordinary care, have been avoided. In my own I feel assured it could. For many years I had been in the habit of using the cyanide of potassium on my hands with impunity, and foolishly imagined that my cuticle was stout enough to resist anything; therefore I took no precautions whatever. This, I regret to say, proved a mistake. My advice, based upon experience, is to take every precaution to avoid the evil in the first instance, and the best plan of doing this is to scrupulously cleanse the hands from all traces of the bichromate immediately after work is finished. If, however, at any time an irritation between the fingers makes its appearance, at once adopt vulcanized india-rubber gloves for working in. After all, they are not so inconvenient as might be imagined, and a little French chalk dusted inside them occasionally will allow them to be put on and removed with the greatest ease.

In conclusion: I may add as my opinion that it is not in the sensitising of the tissue, or in dealing with cold solutions, that the injury results, but in the development of the prints. Here the hands are continually in a warm (sometimes quite hot) although a very dilute solution of the bichromate, at a time when the pores of the skin are necessarily in a more or less open condition. Therefore, it is after the development of the prints that I conceive the greatest precaution is required.

THE DARK ROOM AND ITS LIGHTS.

By G. Watmough Webster, F.C.S.

I have preferred to speak of the "lights" rather than the "illumination" of the dark room, because, in the first place, I do not wish here to enter into such debatable ground as that usually included in the latter term; and, secondly, it is my impression that the injurious effects that have been shown to result from modern dark-room work may be traced rather to the lights as *lights* than to the general colour of the illumination.

It is matter within everyone's knowledge that, since the introduction of gelatine plates, the ruby glass theory has held almost universal sway, and there has been a natural tendency to devote the greatest attention to secure what has been deemed a correct illumination of the plates, whether in developing or the simple changing of the slides, disregarding any question of eyesight. The result has too often been that blind after blind has been placed over portions of the windows of the room when daylight has been used, or, where artificial light has been the source of illumination, intercepting screens have been built up in each case with no thought beyond the effect of light upon the plate. From this it has followed that the plate having been considered properly looked after the eyes might take care of themselves; the full glare of the lights have in many instances been allowed to fall upon the operator's eyes.

In every respect this system is bad. It is as essential that the eyes be protected from glare as the plate from injurious light, and I feel sure that the whole body of photographers are indebted to Mr. W. E. Debenham if only for the attention which has been drawn to this aspect of the subject through his writings. I have devoted much time to the study of the functions of the eye, and one of the most earnest warnings I could give would be—let every photographer be careful not to strain his eyes for any length of time by working under a dim illumination, and, especially when developing by an enfeebled light, not to allow a stronger illumination to fall on the eyes. If my words ended here, and were well acted upon by everyone, I should feel I had done a vast amount of good; but to make what I write as practicable as possible I will describe the illumination of my own room—not necessarily for imitation, but as an illustration of principles.

I have always been an advocate for plenty of light in the dark room, and in my own the windows are about ten feet wide, including the mullions, and three feet high. They have a removable sash in front of the outer one, and they lie at the back of a long tank, over which the developing is conducted. For a long time I worked without artificial light, as I was easily able to do by removing one sash and working with only one thickness of glass when the light was dim. As this plan did not, owing to the continually-varying intensity of the light from the sky, enable me to judge of the density of the negative with sufficient accuracy to please myself—and in winter time or late in the day gas became a necessity—I determined to develope by gaslight alone under all conditions of weather. I am very pleased with the change.

Between the two sashes is a gas bracket with a chimney over the burner to carry the fumes outside, and a tap, fitted within the room, for turning down the light without removing the sash. The lower half of the sash is covered with whatever medium I prefer to filter the light with. If I wish to experiment in that direction it is readily changeable, the medium being placed at such a height that the light must pass through it to arrive at the developing dish. If my explanations be followed it will be seen that there is nothing between my eye and the naked flame beyond one thickness of coloured glass, and this obviously allows the very glare I decry. Hence I placed a projecting board so hinged to the upper part of the movable sash that I can bring it to any angle I prefer. Its length is so arranged that while it does not interfere with my seeing the developing dish it entirely hides the light itself, and also the illuminated translucent medium which is attached to the sash as described.

I thus work in complete comfort, my eyes quite shaded, and the work illuminated exactly as I consider right. But there arises the question of how to judge of the intensity of the negative, and this I find difficult to perform correctly unless I have a rather strong illumination. Even if I could see it without stooping (which I cannot) the translucent material is not bright enough for me.

I have contrived another arrangement so as to enable me to have, as a backing, the light itself just sufficiently dimmed to render it safe for a few seconds' exposure. I found it difficult to arrive at a decision as to the best material for the purpose; and to experiment readily I attached to the sash in front of the flame (which, by the way, is a little below the level of my eyes) a series of parallel grooves into which I could quickly slide one or more coloured glasses, &c., so as to judge of the effects of single or combined colours. I will not now stay to describe the many substances—stains and glasses—I have tried; they have been very numerous. Every operator will, perhaps, prefer to form his own judgment. I fixed upon one combination, and it has remained in its place for many months; if I see cause to change it I can do so in a moment. There only remains now to describe in what manner I examine my negative, seeing that there is an opaque screen between my eyes and the light. I simply cut out a rectangular aperture in the board, just high enough to clear my eyes from the light except when leaning forward, as I do when I raise the negative to examine it. At other times no light comes through the aperture upon my eyes.

I conclude by describing the last addition to my comfort. My eyes are not so young as they once were, so that near objects are less distinctly perceived, and to see detail—whether the negative, when placed at a convenient position in front of the light, is sharp, &c.—strains them. I remedy this by placing a small brass peg in the wood screen immediately over the upper part of this small aperture; and slipping upon it a convex eyeglass of suitable focus — these being purchasable pierced with a hole—I find myself able to work with a maximum of comfort, and with ease, certainty, and safety.

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DRYING GELATINE PLATES.

By Colonel Stuart Wortley.

I am convinced that one of the most important questions in regard to the preparation of dry plates is the final desiccation of the films.

Thoroughly desiccated their permanence seems to be undoubted, but without such desiccation they are very uncertain in keeping qualities. When I went round the world in 1880 I took with me many experimental batches of plates of my own make, as well as those by various commercial makers.

The first of the latter which gave in were Nelson's "favourite," and these had been packed in so damp a state at the manufactory that the paper between them stuck to the corner of the plate; and I have since then, by careful experiment, traced many of the imperfections of dry plates to the want of thorough drying. My own practice is to allow plates to become dry to all appearance without any artificial heat, and then to give a very thorough desiccation at a temperature of 70° to 80°.

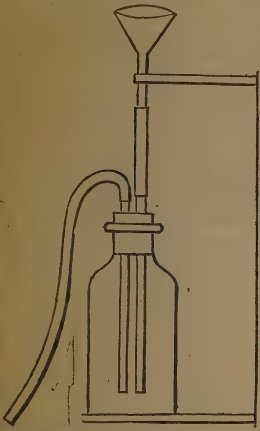
The time taken to become dry varies much with the state of the atmosphere, but I consider a properly-made plate would be dry in from eight to twelve hours. In very damp weather a little gentle and dry heat may be put on, but it is fatal to attempt to hurry the drying by using heat at first. A certain amount of moisture must be allowed to get away from the film spontaneously. If this be not done the plates blister to a certainty.

A WASH BOTTLE FOR PRECIPITATED EMULSION.

By H. Y. E. Cotesworth.

The great, if not *the* only, drawback to one of the most perfect methods of emulsification, namely, by precipitation, lies in the great length of time requisite in order to allow the precipitated bromide to subside completely between the various washings. After each subsidence it is inexpedient to pour off the water too closely for fear of losing a portion of the deposit, and thus a certain very appreciable portion of the soluble impurities remains behind in the second wash water, and so the operation of washing becomes one of gradual dilution, each such dilution being necessarily followed by a rest of at least several hours, during which the precipitate is subsiding.

With the following simple wash bottle the time is greatly curtailed, and the result is a much more perfect elimination of the soluble impurities. It consists of an ordinary wide-mouthed bottle, of a capacity suited to the quantity of emulsion to be treated, into which the thin emulsion after mixing is transferred in order to settle. The bottle is fitted with a good cork, through which are passed two straight glass tubes of about one-eighth inch bore. To one of these about a foot or more india-rubber tubing is attached and allowed to hang loose; the other one is connected by means of rubber tube with a glass funnel held in a suitable stand or passed through a hole in a shelf at a distance of a few inches above the bottle. The apparatus is then complete.



Having mixed the solutions of silver and bromide by whatever modification of the process may be adopted—I employ Burton's myself—and having attained sensitiveness by boiling or otherwise, the emulsion is transferred to the bottle and set aside until the bromide has subsided into a solid cake at the bottom. This will take, probably, twenty-four hours, or may be longer, according to the method of preparation adopted; but this is the only serious delay in the process. The perforated cork is now inserted in the bottle, and without disturbing the precipitate the two tubes are carefully pushed down to within an eighth of an inch of the layer of silver bromide. Water is poured into the funnel or allowed to trickle in slowly from a tap, when, as soon as it reaches the level of the bend in the rubber attached to the other tube, the latter begins to act as a syphon and draws off the water containing the soluble decomposition product, its place being immediately taken by clean fresh water from the tap.

Thus a constant current is set set up without in the least—if matters be properly arranged—disturbing the layer of bromide, and in a few minutes the waste water will be found to come away perfectly free from contamination. The inflow of water is then arrested, and the outlet tube continues to act as a syphon until the precipitate is drained nearly dry. Then all that remains is to add the softened gelatine, apply heat, dissolve, and complete the emulsion.

So small a trace of soluble matter remains entangled with the sedimental bromide that I have never found it necessary to repeat the washing; but, if for extra security it be so desired, the precipitate after one draining may be shaken up with a fresh supply of water, allowed to subside, and again treated in the same way, after which it is difficult to imagine that any impurities can remain.

With a single washing I have made some of the most perfect emulsions I have ever had by any process, and with absolutely no trouble, for the emulsion practically washes itself without any attention. The whole arrangement may be made for sixpence.

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ON SETTING—GELATINE PLATES.

By A. L. Henderson.

I hope your readers will not think me egotistical when I say that very few plate-makers have any idea of the difference of quality and results which are obtainable from plates set at various temperatures. Now, for argument sake we will suppose that we have two gallons of emulsion, that we commence to coat in the morning, that the plates take five minutes to set, and that towards the middle of the day the temperature of the coating-room has risen ten degrees, the plates necessarily taking longer to set this is what is likely to occur, more especially in a very rapid emulsion: the coarse bromide of silver being heavier sinks towards the glass, and when exposure takes place the resulting negative is very thin and poor. Now, if the same plate be exposed through the glass not only will the plate be more sensitive, but a pluckier negative will be obtained, no allowance being made for the loss of light by the rays having to pass through the glass. Neither of the above-named plates will be so good as a plate set in one minute.

I have had a curious example of frilling, and it came about in consequence of long setting. After the negative was fixed I removed the frilling gelatine from the plate, when a faint image remained on the glass, which was easily removed by friction after drying. This showed that the silver bromide loosened the gelatine from the glass, although the same plates quickly set and gave no indication of frilling. I have to give credit to Mr. W. H. Prestwich for the hint that the subsidence of the bromide might have something to do with frilling.

I could write a great deal more on the advantage of quick setting, but I dare say your pages will be filled with equally valuable matter; and, I think I have shown one reason at least why no two persons can get the same result by using the same formulæ.

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NOTES ON ECONOMICAL EMULSION.

By the Rev. B. Holland.

On page 163 of last year's Almanac I gave a formula for the above, and, having continued to employ it for all-round work, I am in a position to commend it more strongly than ever. Nor does its excellence rest upon my personal testimony, for several others (both amateur and professional photographers) who have adopted it have used it with gratifying success.

Its merits are many, not the least being uniformity of character and its workability in a strongly-lighted room. For portraiture with a medium exposure it answers admirably, and for landscape work, in my humble opinion, cannot be surpassed. In addition to this, the small cost of its preparation brings it within reach of all. Nothing better, moreover, need be sought for enlarging purposes, as it yields transparencies and negatives of a brilliant description. Lantern slides of wet-collodion character may easily be produced by it; while, if spread upon paper, it will bear critical comparison with the best gelatino-bromide papers in the market.

A suitable developer—nay, I may say the most suitable and the most simple—is the following:—Carbonate of potash half-a-pound, water eight ounces. This is used from one drop upwards according to subject and exposure with the usual pyro. and water. Bromide is not needed, though, of course, if any have a fancy for its use it may be employed.

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ON COMBINING THE BROMIDE SALT WITH THE PYROGALLOL IN ALKALINE DEVELOPERS.

By Lyddell Sawyer.

Let me ask how it happens that, amidst the numerous varied formulæ cited in connection with preparing pyrogallol-ammonia developers, the plan of combining the pyrogallol and the restraining bromide and using the ammonia independently is, so far as I know, never treated upon.

If there be any virtue in controlling developers, surely this method should at once commend itself as yielding a maximum power in that direction. Indeed, laying surmise aside, I may at once state that my friend, Mr. T. G. Whaite, drew my attention to some of the facilities offered by this process of combination about twelve months ago, and since then I have experimented on the most suitable proportions, and continued to use it with invariable satisfaction.

I perceive no objection that can be reasonably arraigned against it. There is, of course, no deterioration of the solutions so mixed by keeping; and it is obvious that, by mixing the same proportion of the salts for developing as would be used if the ammonia and bromide were kept in conjunction, then certainly the developing power will be precisely similar. Beyond this, so far as I can see, nearly all is in favour of the accelerator being alone, and the retarding and intensity-yielding agents being in combination. If there be an objection worthy of noting it is in the direction of an *embarras de richesse;* for the regulating influence is so active in the case of varying the proportions to meet the emergency of over- or under-exposure that it is apt to go beyond control, or to be brought into use too liberally, without considerable care being exercised. But here the fault is in the lack of judgment of the manipulator—not due to the process—and is hence almost beside the question. I might conjure up much argument in its favour, but space in the ALMANAC is valuable, and I would prefer to recommend its readers to the more satisfactory course of trying for themselves.

I give my present working formula. Although beyond simplicity of mixing, I claim no novelty or advantage for it; nor would it be recommendable for all plates or, indeed, at all seasons. I prepare one stock solution of pyro. twelve per cent., and ammonia bromide six per cent., or forty grains of pyro. and twenty grains of bromide to the ounce. The other stock solution is simply one of ammonia twelve per cent., or forty minims of ammonia to the ounce. By again reducing these solutions to ten per cent., and adding half of one to the other for working strength, they become—

Pyro	2 grains,
Bromide	1 grain,
Ammonia	2 minims,

to the ounce, and constitute my normal developer. So far this formula is ordinary enough; but the margin of control obtainable by adding a preponderance of either the ammonia or pyro.-bromide solutions is of wonderful extent, and I have confidence in believing that if tried it would secure invariable adoption.

HINTS ON THE PREPARATION OF GELATINO-BROMIDE EMULSION.

By W. ROBINSON, JUN.

IN order to select a suitable gelatine dissolve a little of any given sample, coat a sheet of glass, and allow to dry. Then, having placed the glass in a developing tray, pour over sufficient water to cover it, to which a few drops of liquor ammonia have been added. If, after standing for a few minutes, the gelatine should show signs of frilling it may be taken for granted that it is unsuitable—at all events for ammonia development. It does not necessarily follow, however, that it will not answer for soda development; therefore coat another plate, and try it in a similar manner with water to which a little carbonate of soda (common soda) has been added.

There are some gelatines which will stand ammonia but not soda, and there are others which will stand soda but not ammonia. What the precise difference may be I am not exactly prepared to say, though I fancy the former kind contains a considerable proportion of *chondrin*, whilst the latter consists principally of *glutin*. Hence, if the pungent odour and instability of ammonia be objected to, and it be desired to prepare an emulsion for soda development, it would be advisable to use isinglass, or some similar fish gelatine.

When cooking emulsion at a high temperature I have found it better to use from five to ten grains of gelatine to the ounce of water, according to the quantity being made, instead of the one or two grains usually recommended; also, that the solutions should not be used too concentrated, about half the total quantity of water being necessary in order to avoid coarseness.

It is a commonly-received opinion, I believe, that it is possible to over-cook emulsion, especially in the presence of free ammonia; but, personally, I have not found it to be so provided there be a sufficient excess of free soluble bromide (say one or two grains to the ounce), it being entirely a question of modifying the developer to suit. In order to thoroughly test the matter I have repeatedly kept emulsions at a boiling temperature, with free ammonia, for six to eight hours at a stretch. Of course, if the ordinary powerful developer were used to such an emulsion, it would probably fog at once, but by using a greater proportion of soluble bromide, or, in extreme cases, by substituting a weaker alkali, such as the carbonate of ammonia, I have invariably been able to develope perfectly-clean pictures.

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ON THE STORAGE AND KEEPING OF GELATINE PLATES.

By William Brooks.

During the past year this subject has from time to time cropped up in the pages of The British Journal of Photography. Many treat it very lightly and as unimportant, I am aware, many do not keep a stock of plates, and only purchase a dozen or so as they require them.

Most people suppose gelatine in itself, pure and simple, to be an unalterable article, provided that it be kept away from the damp. At one time I held this opinion, until certain things occurred that caused me to change that view.

Some two or three years since I came across what I considered to be a splendid example of gelatine in the market, and thought that I had better lay in a stock, which I did not fail to do, of course, thinking it to be an unchangeable commodity, but to my regret I was doomed to disappointment. When I first bought it the plates made from it would bear any reasonable amount of ammonia and prolonged development without the least signs of frilling, &c.; but after about eighteen months matters altered, and I could not produce a plate under the same conditions that would stand a reasonable amount of ammonia without being covered with pimples or very minute blisters and insensitive markings. On changing the gelatine of the same make, only of newer sample, things went on as perfectly as ever. To my mind, it is conclusive that gelatine does alter.

Now, as regards the packing of gelatine plates: I think with some makers sufficient care is not taken to have the plates thoroughly dry before packing. I saw only a short time since a packet of plates that on opening was quite mouldy. When I do my plates up in dozens for keeping, before packing I heat my drying-box up to 80° or 90°, so as to make sure all moisture is driven out of the plate. Another precaution I take is to make sure that the paper I pack in is thoroughly dry; for, even if the plates are dry and the paper is not, gelatine being of such an hygroscopic nature the moisture is readily taken up by it.

Some three years since I had occasion to make two or three dozen plates of a certain size, and I had a one-dozen packet left over. I had also three double dark slides charged with the same batch of plates. A few weeks ago I used these plates for copying. The slides were made of well-seasoned teak, made by Meagher, and have been in use about twenty-five years; but, on attempting to develope, the plates were found to be covered with thousands of black spots, though in other respects faultless. Having exposed all the plates in the dark slides I hunted out a packet containing one dozen of the same batch. I found on developing that these were perfect in every way, and not a speck or spot to be seen. So beyond doubt dark slides, however well-seasoned and dry, are not the best things to keep dry plates in. I find no better way of storing plates than in brown paper packages kept in a tin box.

I remember going on a trip some two years since, and to make the most of space I packed some twelve dozen plates with sheets of well-dried *papier Joseph* between them; but on development I found the plates marked by it more or less with the marks of the frame that the paper is made in, so I did not try that system again, and went back to the crimped blotting-paper. I never will use plate-boxes with the vulcanised india-rubber pads or cushions, as I have found that small particles of sulphur are constantly being given off to cause black spots. I much prefer pieces of leather, which answer every purpose.

◆

SPOTS IN GELATINE PLATES.

By W. Harding Warner.

Having had a somewhat large experience with these defects in working gelatine plates, a few words upon them and their cause may not be unacceptable, and give ease to many a mind.

Small round spots, which when the plate is fixed come out sometimes as clear glass singly, but generally in a cluster, seem to proceed from either the plate being improperly cleaned from grease, too warm to receive the emulsion, or the latter too warm for the plate. They are often found in plates coated on a pneumatic holder.

Another form of spot is a round, insensitive patch, with a small dot of black in the centre—sometimes of equal density, and at others with a small halo of light round it. Occasionally there is no dot. Another form is an apparently insensitive patch of a dark colour, like ground glass, here and there all over the plate, which may be seen by allowing the light to fall obliquely along the plate previous to putting in the slide. They sometimes may be observed, and more frequently occur, in small plates containing iodide and bromide than in the larger sizes of plates. Some spots appear to hang one over the other; but these, it should be noticed, are not met with in plates which are probably coated by machinery, by which means they can be avoided. All, however, except those I have mentioned are not seen until development takes place.

A microscopical examination reveals the fact that most of these spots are caused by coating with the teapot holder, and in the pouring off, perhaps hurriedly, too much haste has been used or an error in judgment made as to the amount required to be drained off. Consequently, when placed on the slab to dry superficially, an unequal portion is left, which when reared up slantwise to permanently dry runs down like a tear, a distinct tear mark being seen. The *nucleus* is excess of emulsion, which drying dead forms the spot, the black dot being either a speck of dust or an imperfectly-dissolved atom of salt of silver.

As all these spots print, and as also all such plates are weak and not homogeneous throughout their entire structure, extra care should be given by plate-makers to avoid such, now that they are significantly pointed out. The plates are probably coated by contact, and the desire to get through a large quantity in a given time necessitates speed. In plates supplied only twelve months ago these latter faults were not discoverable. The reason why the larger plates are cleaner is that they take more time and a larger quantity of emulsion to cover them.

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INFLUENCE OF TEMPERATURE AT THE TIME OF MIXING EMULSIONS.

By J. Barker.

In order to test the effect of difference of temperature at the time of adding the silver to a gelatino-bromo-iodide emulsion, a sample was divided into three portions, and the same amount of silver in crystals added to each, the temperature alone being different in each case at the time of adding the silver.

In No. 1 the emulsion was about 100° Fahr. at the time of adding the silver. In No. 2 the heat was increased to about 140° Fahr.; in No. 3 to about 212° Fahr. I might add that Nos. 1 and 2 were subsequently boiled for an hour and a-quarter, and No. 3 for one hour.

The results showed that in No. 1 the emulsification proceeded slowly, taking six or seven minutes before forming homogeneous, creamy emulsion. In No. 2 the same result was accomplished in about four minutes, the finished emulsion being more rapid than No. 1. In No. 3 the emulsification seemed to take place at once—that is, as fast as the silver dissolved, the emulsion seeming to have less body in it. The rapidity was slightly greater than with No. 2, which, seeing that it was only boiled for one hour, would seem to show that a difference of 72° Fahr. at the time of mixing a neutral emulsion is equal to about a-quarter of an hour's boiling afterwards; the finished emulsion, however, gave a rather thinner image. The result of the experiments was that No. 2 gave the best all-round results.

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REMARKS ON SIX YEARS' PRACTICAL EXPERIENCE IN COMMERCIAL DRY-PLATE MANUFACTURE.

By Joseph Gray.

It may be asserted that gelatino-bromide dry plates have caused a revolution in the photographic world, and to illustrate my meaning let me briefly contrast the old process with the new.

Immediately preceding the advent of commercial dry plates a deal of controversy concerning the new process was experienced, and the severest scepticism from the old school; but, like everything else new, it only required time to prove its persistent merit, and therefore the advantages being great terminated in "the survival of the fittest." With the wet-plate photographer an enormous amount of labour mentally and physically is incurred, success in the matter of *technique* depending on the manipulator's capacity and experience with the troublesome chemicals. Notwithstanding the great trouble arising from the continual change the bath is subject to, we have work produced by the wet collodion process when in its best condition not excelled or perhaps equalled by the dry-plate process; consequently we must not depend too much on the old method, but endeavour briefly to contrast the difference in freedom of working the new process from the old. It is unnecessary to describe the wet process in this communication, as every photographer knows it probably better than the writer; but I simply make this outside allusion to it by way of a reminder which makes us appreciate more the difference of facility in producing first-class photographs with dry plates.

Estimating that there are some fifty dry-plate makers in Great Britain, and presuming that every one has some little difference in his formula and method of preparation, it is clear that these variations must entail some slight modification in the physical state of the film. This variance in the condition of the film does not, perhaps, manifest itself so much to the general worker as it may do to the experienced dry-plate maker; nevertheless, it will more or less give negatives possessing different printing qualities.

Let me endeavour by the following experiment to prove my assertion. I take ten plates of ten different makers and expose them to artificial light by contact against a negative, each plate being exposed ten seconds at the same distance from the light. Each plate is then developed by its maker's formula successively, and then the operation is repeated and the plates developed all by one formula—our own. In the first series—developed by their own formulæ—one make developes soft, vigorous, and beautiful; another make developes black and white, with little or no detail; and a third plate of another make possesses quality intermediate between the former two. Almost the same results are obtained when developed by one formula, showing that no two makes of plates require the same treatment. No doubt with different exposures we could have got more uniform results; but, granting that the plates were all specified the same degree of sensitiveness, we would infer that we should get equal rights with similar treatment. Such is not the case, and probably never will be, as I will try to show in what follows.

With one make of plate we have a nice matt surface, which indicates that the silver salt is well exposed on the surface of the plate, and is undoubtedly easily amenable to the action of light and development. Another maker's plate we find glassy on the surface with a mirror-like reflection from it, and a third maker's plate we have a film-state intermediate between the two former. These three plates being exposed and developed under precisely the same conditions we find a difference in the character of the negatives. No. 1 (the matt plate) developes rapidly; No. 2 and 3 (the glassy and intermediate) develope at about the same rate. No. 1 gives a vigorous, soft negative, No. 2 a soft negative with a tendency to give thinness, and No. 3 a negative brilliant, soft, and vigorous. From this experiment we find the plate No. 3 would require more pyro. to give the same result, and the difference in the film giving this varied result I think to be a difference in homogeneity and molecular state.

To account for this condition of things we must go back to the preparation of the emulsion. Given that we make three batches of emulsion with three different kinds of gelatine—one hard, another soft, and another softer still, while each contains the same quantity of salts and all are cooked the same length of time—it seems that one kind of gelatine is more favourable to finer homogeneity than the others, which, when spread upon a plate, show the intermediate character. The other two batches may be said to give the other characteristics. But these characteristics are not to be attributed to the gelatine alone, but to the way in which the emulsion is prepared; for instance, there may be organifiers or other foreign-matters employed which will account for the difference. Sensitiveness depends partly on how the salts are incorporated in the film. No doubt fineness of division with the minimum of vehicle consistent with sufficient suspending faculty is the condition to be aimed at. Seemingly iodo-bromide plates are the quickest known, but how the rapidity is obtained remains at present in the hands of those who make them.

The object of these remarks is to point out to those who try all makes of plates alternately that good plates may be condemned by the operator too rigidly adhering to one formula; whereas if he were to modify the proportions of the alkaline development to suit plates which give thick or thin or black and white negatives a great deal of trouble and expense might be saved by the seller and buyer.

A few remarks on gelatino-chloride plates. I find that the plates already in the market give beautiful results with great certainty, but the developing formulæ are very expensive and complicated, necessitating a deal of work to produce them. Anticipating that they might be developed by the ordinary bromide-plate developer, I set myself to experiment in this direction, and I am able to say that we now make plates which can be developed by the ordinary alkaline development only requiring different proportions.

I will append the following formulæ for the development of chloride plates:—

Formula No. 1.

Pyrogallic acid	20 grains.
Water	10 ounces.

Liquid ammonia, sp. gr. ·880	1 drachm.
Bromide of ammonia	80 grains.
Water	20 ounces.

A mixture of equal quantities of these solutions will develope a properly-exposed transparency in about half a-minute. To witness the development by this formula one would think, when first the image commences to appear, that it was far too thin, as the lights and shadows almost come up simultaneously; hence the development must be prolonged till sufficient density has been obtained. One would think this would obliterate the shadows, but such is not the case, as they seemingly do not get a proportionate deposit by prolonging the development, providing the exposure be right. I have with this method developed twelve perfect transparencies successively from twelve plates.

They also can be developed by the following:—

Formula No. 2.

Sal-soda—washing soda	1 drachm.
Bromide of ammonium	10 grains.
Water	10 ounces.

Pyrogallic acid	20 grains.
Water	10 ounces.

Equal quantities of these two solutions will develope a plate in one minute. The developing action is analogous to the ammonia-bromide developer; therefore, requiring the same treatment only, with this developer we get a brown tone.

Formula No. 3.

Bicarbonate of soda	130 grains.
Water	10 ounces.
Pyrogallic acid	20 grains.
Water	10 ounces.

Equal quantities of the above two solutions will develope a plate in about a minute and a-half, and will give a tone the colour of port wine. The bicarbonate developer will act more quickly without any ammonia-bromide, but may have a tendency not to give quite so clear glass. A variation in tone can be obtained by altering the proportions of any of the three formulæ. If we desire a black tone, over-expose and mix three-fourths of the pyro. solution to one-fourth of either of the alkaline solutions, and if we desire warm tones expose right, and use three-fourths of the alkaline solutions to one-fourth of the pyro. solutions.

I may mention that with the ammonium-bromide developer it is advantageous to use twenty grains of carbonate of ammonia in the twenty-ounce solution of ammonium bromide. This will ensure clearer glass in the shadows. After the plates are fixed and well washed I use the following clearing solution:—

Citric acid	2 drachms.
Alum	½ ounce.
Water	10 ounces.

By immersing the plate in this for half-a-minute or more I find it appreciably clears any stain—if there be any; but it is very rarely you can detect any opalescence, even without using the clearing solution. These remarks may, I hope, be of service to the transparency worker.

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THE KEEPING QUALITIES OF BROMIDE EMULSION.

By L. C. Meves.

Perhaps it might be interesting to some of your readers to know the keeping qualities of bromide emulsion. In November last year I made some emulsion, and being aware that I was shortly to visit Australia I thought I would like to know how it would keep during a journey out there. Accordingly I filled a Mawson's collodion bottle full of it, but not having any conveniences for using it while in the colonies I brought it back with me a few weeks ago, and finding that to all appearances it was in good condition I melted and coated some plates. These I found, when tested in the camera, to be quite equal to those coated when the emulsion was first made, the latter not having deteriorated in the least either in quality or rapidity.

This fact might be worth the consideration of some of our dry-plate manufacturers, for there are yet many good firms in Australia who still adhere to collodion and will not use dry plates. When asked the reason why they say the dry plates are not reliable, owing, perhaps, to the long journey out; and many are often found to be broken, thus causing them to be very dear.

Now, if emulsion were exported in bulk I think it would meet with a large demand, as photography is very well represented in all the colonies; in fact, it is one of the most flourishing businesses out there, the principle streets being thickly populated by photographers—in many instances next door to each other.

I will conclude by saying that at present I am aware of only one gentleman in all the colonies who makes plates commercially, but in studios where they are used I think the English dry plates take the lead.

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STAINED GELATINE PLATES FOR PORTRAITURE.

By J. WILSON.

BEING curious to know whether stained gelatine plates, such as Dr. Vogel and others have so successfully employed in copying oil paintings and colour scales, would be of any assistance to the portraitist, by giving the colours of face and hair their true values, an experiment was made in my studio. It was feared that the cause of failure would be the length of exposure required. The experiment did fail, but not exactly in the way anticipated, and I by no means consider that the uselessness of stained plates is thereby demonstrated.

A commercial gelatine plate ("Britannia"), such as we use every day for portraits, was cut in half. One half was placed in a ten-per-cent. solution of turmeric for about a minute, slightly washed, and exposed five times as long as the unstained half, to which the usual exposure was given. When developed and dried there was very little difference between the pictures on the two halves of the plate so far as gradation of tint was concerned, but the whole film of the stained half was yellow. Prints from the two ends would probably be much alike. Perhaps a longer exposure would have given a better result, but sitters will not nowadays willingly submit to a long exposure. Perhaps some of the aniline dyes would have given better results, but the turmeric was ready at hand.

Another experiment, made by copying an oil painting, was more successful, and satisfied the claims put forward on behalf of stained films. The stained plate gave a much more brilliant negative than the unstained.

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RAPID PLATES FOR AMATEURS.

By "AJAX."

ON again complying with the request for a short article to the welcome ALMANAC, it scarcely seems possible that twelve months have elapsed since the appearance of the present yearly volume was anticipated. The past twelve months have not caused me to waver my opinion in the least with reference to gelatine dry plates, and especially to the soda developer. Without further preface I will at once give the simplest instructions for making the above, suited alike for the amateur or professional photographer.

In two ounces of distilled water dissolve twenty grains of gelatine, and add to it (having previously dissolved in two other ounces of water) 110 grains of bromide of ammonium, 190 grains of bromide of potassium, fifteen grains of iodide of potassium, and forty grains of chloride of ammonium, and shake well together. Then add six ounces of alcohol to which has been added two drachms of strong liquor ammonia; mix well together. Then add to the whole six ounces of water in which has been dissolved 480 grains of nitrate of silver; keep the bulk just warm, and add one ounce of dry gelatine and stir gently until dissolved.

This can be kept warm from one to ten hours, as may be convenient. Then pour the whole into a pint of warm methylated spirit, and when cold you will find a lump of hard-set emulsion of exquisite sensitiveness. This will make from ten to twelve ounces of emulsion. Coat the plates and dry as usual, and develope with common washing soda one pound, alum half-an-ounce, citric acid half-an-ounce, bromide of potassium a-quarter of an ounce, and water sixty ounces. To one ounce of this add a small quantity of dry pyro., and use judgment as to density. I have no hesitation in saying that from these formulæ one may obtain black skies with clear glass shadows and no veiling of the intermediate lighting of the subject. Fix in hypo. as usual.

I have had the most flattering recognition from an unknown friend in America of this or a very similar formula, and the specimens of instantaneous pictures he has taken from plates prepared from the above are exquisite examples of what can be done by it. I trust before your intimation of the close of another year many present novices may have entered the arena with camera, tripod, &c., and gelatine dry plates.

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A PRACTICAL METHOD OF ENLARGEMENT.

By Valentine Blanchard.

There is abundant evidence in this year's Photographic Exhibition, as well as in former ones, that it is quite possible to make enlargements which cannot be detected if the amount of enlargement be not very great.

Artists are almost unanimous in their opinion that an enlarged landscape is truer to nature and more artistic than a picture of the same size taken direct in the camera. There is a mellowness and breadth due to the absence of the usual painful microscopic sharpness that at once appeals to them, and these qualities tell with particular force on the walls of an exhibition where the picture is not usually viewed with such close scrutiny as when held in the hand and examined in a strong light.

The plan of enlargement recommended by me some years ago in a communication read at the Photographic Society of Great Britain has now been well tested; and the object of the present paper is to go over the old ground, but with some modifications, in the hope that it may be found useful to those who may not be familiar with the paper in question.

To begin: A copying camera, or some arrangement to answer the purpose of a copying camera, will be necessary. The following plan answers perfectly:—A camera large enough for the size of enlargement required, and capable of considerable extension, should be placed on a table or on a long board resting on the camera stand, and supported at the other end with a head-rest. Any good lens well covering a quarter-plate will do, but it should be reversed; that is to say, the front of the lens should be inside the camera. Now take a small camera, but without a lens, and put the hole in the front over the lens attached to the large camera, and raise up to the requisite height with a box or by any means ready to hand—of course taking care that it is sufficiently rigid. Put in the dark slide of the small camera the negative to be enlarged, pull out the shutter, and remove or turn down the back. The negative can easily be held in position by a pin or two. Now place a piece of white cardboard or paper at an angle of 45°, so as to throw a flood of even, white light on the negative, and be particular to have the reflector large enough. When the image on the screen is of the requisite size, and a stop sufficiently small to secure sharpness to the extreme corners is inserted, it will be well to cover up the junction between the two cameras with a focussing-cloth or any other suitable material at hand to shut out any stray light, as only the direct light from the reflector, after passing through the negative, should fall on the lens. Now make the exposure, and here, of course, practice will be necessary to rightly time it.

For development I would strongly recommend the employment of the bromide with the pyro., and the careful addition of the ammonia. The object is to get out in the transparency every gradation to be found in the negative without the slightest trace of veiling anywhere. To do this to perfection slow development will be necessary. The transparency should show as solidly as in the negative every detail when held up to the light. As soon as the transparency is dry it is ready for further operations.

If a print be made on albumenised paper and fixed in hypo. without toning, and if after washing and drying the same it be waxed and a print be made from the paper negative thus furnished, I am sure that those who try the experiment for the first time will be surprised with the beauty of the result. But for those who might object to the slight grain that would be visible on a close inspection, two other methods are open:—The transparency can be put in the dark slide and a dry plate of the same size placed in contact. Extend the camera to the fullest extent and remove the front lens. The object is to obtain an even flood of white light equally illuminating the whole of the focussing-screen. Place a piece of white paper or cardboard at an angle of 45° in front of the lens, and look in the screen to see if the illumination be even over the whole surface. If the inspection be satisfactory now make the exposure, which need not be more than three or four seconds. Develope in the ordinary way, and, if rightly timed, a perfectly good negative should be the result. The other method is to make a print of the transparency on suitable tissue, develope on glass, and, if the image be not strong enough, intensify with permanganate of potash until a suitable printing colour is obtained.

Of the three methods the last is the best if the object be to obtain an enlargement that shall not be recognised as such, except by the most acute observer. If the original negative be about 7½ × 5, the enlarged transparency not larger than 15 × 12, and all the operations correctly performed, then I do not hesitate to say that the finished result will astonish those who have not worked in this direction before.

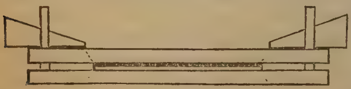
CLOUD NEGATIVES.

By J. M. Young.

In spite of the great powers conferred by gelatine on the landscape photographer, the difficulty of getting a harmonious sky together with the average landscape picture is still recognised. The photographer, whether amateur or professional, has, as a rule, sufficient on his hands in hitting every other happy condition for the successful rendering of his picture without waiting for what might appear the exact combination of cloud most suitable to the composition.

Much may be done, however, by the use of cloud negatives taken independently; and every landscape printer ought to have a stock of cloud effects, either on glass or transluscent paper—the latter by preference—as they may be made to do double duty by being printed on one side or the other. The operation of printing-in is so easy that it need deter no one from attempting it. The ordinary printing-frame may be laid aside after printing the proof from the negative, and the following simple appliances take its place in the double printing:—Two strips of glass of the same size as the print, a clean plate of the same size, four American pegs, and a piece of clean blotting-paper folded the same size as the print. Take the print and cloud negative and carefully adjust them; then place both down on clean glass, the cloud negative and the face of the print being in contact. Cover the back with blotting pad, and then one strip of glass, and secure by two pegs to the front glass; follow with the other strip, securing the same. The whole may be done in a moment, and may then be exposed to light. The object of the strips of glass is to allow the print to be examined, the strip securing the sky part being removed in the operation. A rough mask of brown paper torn to match the outline of the landscape is necessary to protect the high lights during the short time the cloud negative requires to print.

Amongst a lot of odds and ends which had lain on my shelves for probably twenty years is the piece of apparatus I originally designed to save the necessity of employing a large quantity of silver solution in sensitising a collodion plate, and it may prove of some utility as a developing dish under the new *régimé* of emulsion. It is made of two wooden frames held together by two wooden upright dowels bedded in a lower frame, and working up and down corresponding holes in the upper frame. The principle of the ordinary letterpress will explain. The pressure is secured by two wedges fitted through slots in the dowels or pillars, and bearing on the face of the upper frame. A pad of black india-rubber tubing is fixed on the lower face of the upper frame, so that when a plate is placed on the lower frame—face, or prepared side upwards—and the wedges pushed home, a water-tight tray is made, the plate itself being the bottom. Development may proceed with certain advantages, such as saving of solution, freedom from frilling, facility in examining the plate for density, &c. My old dish has a well, into which the silver solution was allowed to drain after sensitising; but this is not shown in the rough sketch.

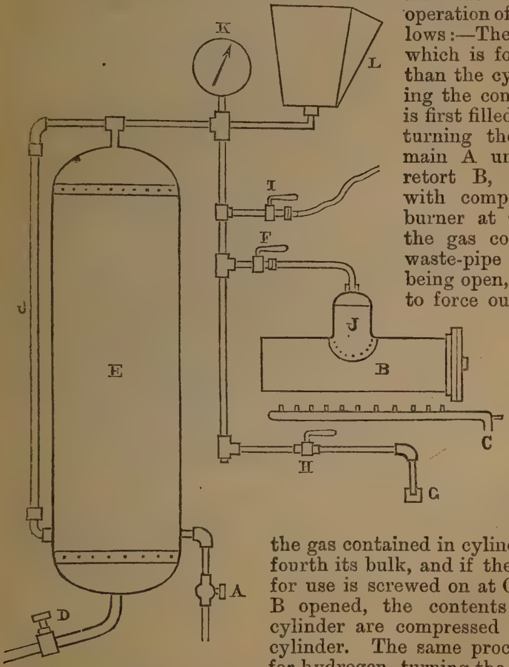


A METHOD OF FILLING OXYGEN AND HYDROGEN CYLINDERS.

By Geo. R. Prowse (Montreal).

The following is a sketch of my system of filling oxygen and hydrogen cylinders. I may explain that our pressure of water from the pipes is sixty pounds to the inch, affording a compressed pressure of four atmospheres in each cylinder.

The oxygen generator is of wrought iron, with a screw cap on end. A coupling is on the outlet pipe, so as to clean with water the pipe after each time used. The operation of filling is as follows:—The large cylinder, which is four times larger than the cylinder containing the compressed gases, is first filled with water by turning the cock at the main A until full. The retort B, being charged with compound, the gas burner at C is lit, when the gas comes off. The waste-pipe cock at D, being open, allows the gas to force out the water in the cylinder E until it is empty of water and full of gas. The cocks D and F are then closed and A opened; the pressure from the main entering compresses the gas contained in cylinder E into one-fourth its bulk, and if the small cylinder for use is screwed on at G, and the cock B opened, the contents of the large cylinder are compressed into the small cylinder. The same process is repeated for hydrogen, turning the hydro. cock, I.



The glass gauge at J is handy for showing progress, and the steam gauge at K shows pressure. The rubber bag at L is to relieve any sudden pressure. With this in experienced and careful hands no accident need occur. Trouble usually occurs in the retort, and provision should be made for the boiling chlorate of potash, which will stop the outlet. The drum at J on the retort prevents any such accident, and if water be run through all the tubes no danger need be anticipated.

My belief is that no careless, inexperienced person should meddle with the manufacture of gas; and any careful person may use this arrangement of mine with success and ease, the only requirement being the understanding of its parts. If I have not made all quite clear I will be pleased to inform you further.

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ELECTRIC LIGHT IN DEVELOPING ROOMS.

By J. Désiré England.

A great boon to photographers would be the electric light in the dark room. For this purpose he will not require what electricians grandly term an "installation," which means a gas engine, dynamo, and all the other paraphernalia; but a light suitable for his purpose need not cost him much more than a pound and a little labour. The present mode of lighting with oil lamps or gas is most inconvenient and gives off much heat, and where daylight is used from the outside it fluctuates too much.

The electric light has been proposed before—in fact, I have used it two years ago; but, not having the proper form of battery, I found it troublesome, expensive, and the fumes not altogether pleasant. This difficulty can now be got over in the manner I am about to describe.

In each of my plate-drying rooms I have just fitted up a two and a-half candle incandescent lamp, shielded by two thicknesses of golden fabric. The light thus given is quite sufficient to illuminate the room even in the far corners, and is perfectly safe for a reasonable time. I have two large cells of Dale's granule batteries to each lamp. Switches fixed to the door frames turn the current off or on. There is also an arrangement which, by means of a small block of wood on the door, pushes the handle of the switch to the "off" side directly the door is closed.

The light is certainly much preferable to gas light in dry-plate work. It is cool and always ready at a moment's notice—no fumes, as of course the batteries are outside; and, moreover, the electric lamps can be shielded by a non-actinic medium much better than is possible with a gas light. I have not as yet had an opportunity of testing how long the batteries will remain in working order.

Two of the same kind of cells have been used for some time past in my establishment for driving a small electro-motor in the manufacture of emulsions, each battery lasting about a week, using it several hours per day; but, as the light is only required for short periods, it is probable that the cells will not require recharging more than once a month. The consumption of material is very small in these batteries, and they are the best I have tried for the purpose.

The medium that I use to cover the lamps, namely, golden fabric, is certainly a most excellent material. It gives a very bright light, and one may use what seems to be much more illumination with no more risk of fog to the plate than by using a yellow and ruby. The yellow medium illuminates the whole room more equally than the ruby; in other words, the ruby light does not seem to penetrate the darkness to such an extent as the yellow. Any other coloured medium with the yellow except orange or red is not to be recommended, as it cuts off a large amount of light, and does not render it proportionately non-actinic.

I may say that I tried to use a ruby-lamp chimney to shield the electric lamp, but found that the light given was very feeble.

ASTRONOMICAL PHOTOGRAPHY.

By A. Brothers, F.R.A.S.

The subject of astronomical photography has occupied much attention lately—stimulated, no doubt, by the beautiful work obtained by Mr. A. Common, at Ealing, and it will be long before his picture of the great nebula in Orion is surpassed. The matter which now seems to be uppermost is the desire to map the stars by means of photography, and it appears to me that the results already obtained and the method of their production have been overlooked.

It has recently been proposed that a reflecting telescope of *eight feet* diameter be made for the purpose of obtaining pictures of celestial objects. It is very well known that the larger the instrument the greater the difficulty in using it. Mr. Common's reflector is three feet in diameter, and I am not aware that any good work in photography has been done with any larger telescope. The ordinary clockwork was not sufficient to keep this large instrument moving so as exactly to follow the stars, and a correction in the place of the sensitive plate had to be made in such a way that the observer had to keep his eye pretty constantly at the instrument for an hour and a-half when the nebula was photographed—a task of immense difficulty. With an eight-feet reflector there would be more light in the proportion of nine to sixty-four, but this is not all gain as the length of the telescope must be considered. Less time would be required to photograph nebulæ or stars, but the difficulty of using the larger instrument would be immensely increased. Such an instrument must be used in the open air, and a very little wind would prevent work being done.

It seems to have been forgotten that Mr. Rutherfurd, of New York, long ago succeeded in photographing the stars. I have seen a negative of the whole of the stars in the Pleiades done by Mr. Rutherfurd, which is as near perfection as possible. I believe the telescope used is eleven inches in aperture. It is a refractor and is corrected for the chemical rays. The stars are shown in duplicate as clear dots as clear as the (·) on this page, and in sizes proportioned to the magnitude of the stars. When we consider the perfection of the photograph and the ease with which a telescope (say) of twelve or fourteen feet length can be managed in comparison with one of sixty or seventy feet, we must conclude that the handier instrument is the most likely to succeed with.

What I should like to see is a refracting telescope of about *fifteen inches* aperture corrected for photographic work and placed in such a position that would insure many good sights in the year when it could be used, and I feel sure that with an instrument of this kind in competent hands the best work could be done.

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SMALL NEGATIVES AND ENLARGEMENTS THEREFROM.

By G. A. Kenyon, M.B.

The photographer's Elysium has surely now arrived, since we have dry plates of exquisite rapidity and definition; a perfect developer, obtained by using soda with sulphite; a miniature camera for lantern-sized negatives, extending to twelve inches, enabling the use of long- or short-focus lenses (Mr. G. Smith's sciopticon camera); a stand to carry the same, weighing a pound and a-half, of unexceptionable rigidity and great height; exquisite chloride plates wherewith to print transparencies with the utmost facility—the use of magnesium wire reducing the time of exposure for printing to next to nothing at all.

If enlarged paper prints be required Hutinet's "brilliant" paper gives results that leave nothing, or at least very little, to be desired—an image entirely on the surface and of an agreeable colour. Is an enlarged negative required? Morgan's paper is the very thing for the purpose. Its translucency can be perfected by simple immersion in melted paraffine. The simplest apparatus is the best for making such enlargements, the small, bright flame of a paraffine lamp giving finer definition than the large flame of the optical lantern.

But the condenser of the lantern must be used to condense the light of the little lamp. The condenser may be supported on a block of wood, which will also support the negative to be enlarged. Then a rapid rectilinear or other *photographic* lens will afford a better definition than the usual lantern lenses; it may be supported in its usual place on a camera pointed to the negative. The sensitive paper may be upheld on an easel, or in a dark slide placed in a large camera. In the latter case the two cameras need not be actually united. But it is not necessary to enlarge from the negatives, or even to employ a lantern to view the transparencies to advantage. A prismatic stereoscope with the lenses reversed, as pointed out in a leading article in THE BRITISH JOURNAL OF PHOTOGRAPHY not very long ago, enables both eyes to view a magnified image of the transparency with the greatest comfort. Should, however, the subject require it, the small plates offer every facility for taking stereoscopic negatives by simply moving the camera and repeating an exposure.

Lastly: for photographing in dark places, or at night, we have in the oxymagnesium light a most efficient ally. Surely the most sanguine dreams, short of photographing in natural colours, are now realised!

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A NEAT METHOD OF NAMING NEGATIVES.

By C. BECKETT LLOYD.

EVERY now and then a question appears in the Journal on the subject of attaching the name of the subject to a landscape negative, so that it may appear on each print—the plan now generally adopted by all the chief publishers of photographic views. The following method, which I have found extremely useful, is suitable both for amateurs and professionals:—

Presuming that a number of negatives are to be "named," let their titles, numbers, and, if needful, the signature of the producer be already written or printed upon a large sheet of paper, thus:—"*No. 1: Tintern Abbey. C. B. L.*" A large number may be written in a good round hand or printed in clear "block" characters upon a sheet of post paper, and this is then photographed on a quarter-plate. A good ink for the purpose, possessing greater intensity than ordinary writing ink, is the liquid indian ink of the shops.

If the wet process be employed, the negative thus produced after fixing and washing may be coated with a forty-grain solution of gelatine—containing a little glycerine—and dried. When quite dry the film is divided with a sharp penknife, and the separate little labels, each bearing a name, stripped from the glass and attached by means of starch or gelatine to their respective negatives, a clear portion of dark foreground being selected if possible. If that be not available a portion of the film corresponding in shape and size must be scraped away. In this case the characters will appear in the print black on a white ground.

Or, instead of dividing the negative itself, a positive may be taken in carbon or collodion, then divided in the same manner, and attached to the negatives as before; but in this instance the characters will be white.

In a similar manner I have prepared a series of labels for my laboratory bottles, developing the carbon positive upon glass and transferring it to a final support of gilt paper, the labels being subsequently cut, trimmed, put on to the bottles, and varnished in the ordinary way, when they only differ from the usual chemists' shop labels by being neater.

◆

LANTERN SLIDES.

By George Smith (London).

A competition of processes instituted under the auspices of the London and Provincial Photographic Association recently, though it failed in its original intention—namely, to discover which was the best process for producing lantern slides—yet was interesting and instructive. Two negatives were selected for competition, and were in fact submitted to the care of experts in the various processes, wet and dry.

On an appointed day the considerable number of slides so produced from the two negatives was sent in for trial by jury. The trial was conducted in the most impartial manner. The slides from each negative were mixed up in a pile in an indiscriminate manner, and by the use of a double oxyhydrogen lantern were each shown in order on the screen. By a very simple and practically unanimous verdict of all present the best were selected and passed through the lanterns again, until by the "survival of the fittest" the best were again matched one against the other and the final selection made.

The result proved nothing whatever as to the best process—if by that is meant the process which could best reproduce the gradations of the negatives; but it did prove exactly what I had foretold from the first, namely, that although all the processes were capable of giving slides of the highest excellence it would depend upon the operator whether either accidentally or by design he happened to get the best result possible out of the negative.

There were, as I have said, two negatives. One I declined to attempt in the absence of what I considered essential conditions. The result proved that there, also, I had foreseen what actually happened. This negative was one of shipping—an instantaneous picture, very fully exposed and weak, with immense range of half-tones. I saw at once, and confirmed it by experiment, that there were two totally different ways of interpreting the negative—one of fully exposing the transparency, which would have the effect of making the picture look like a night view, and the other of under-exposing, which would have produced a brilliant daylight picture at the sacrifice of the detail in the sky. As a matter of fact, the midnight rendering happened to be the one chosen, with the result that those operators who chanced to hit upon that interpretation of the negative happened to have employed wet collodion and albumen for the two thoroughly equal slides which upon that occasion were considered the best. I say "happened to be chosen" advisedly, for I feel sure that on further consideration the daylight effect would eventually have been preferred, if for no other reason because it more nearly represented the actual scene when the picture was really taken. There can, I think, be no question about that being the only true aim in photography. Any other effect, however brilliant and striking, can only be looked upon as accidental.

In the case of the other negative the slide unanimously and without the slightest hesitation pronounced the best was the one produced by me by the Woodbury process. It was never in doubt for a moment, and unquestionably was the best slide. But, are we for that to suppose that there is any mysterious superiority in the Woodbury process which renders it superior to all others for making lantern transparencies? Nothing of the kind. It is infinitely more difficult to work than any other process. I do not hesitate for a moment to say that by any of the ordinary developing processes I could produce slides from the same negative which should unmistakably beat my Woodbury slide. It was simply that my greater experience had taught me what to expect from a negative. It had to be humoured—most negatives have to be; but it was absolutely untouched except an accidental defect or air-bubble in the glass upon which the original negative was taken. This showed very prominently in those slides which had been exposed to direct sun or artificial light. I have no recollection whatever of having removed it, but it is very likely that I may have done so, as it is my invariable practice to aim at perfection and neglect no possible precaution to ensure it. Some idiot among the audience—I really cannot treat him as anything else—took exception to this "spotting out." I should be an idiot if I neglected it when it can be done in a moment on the "mould," while it is next to impossible to do it neatly on the transparency. Why, it is the one advantage of the process and the one reason why I have laboured all these years to perfect it and reduce it as I have done to an almost mathematical certainty.

"But," he objected, "no one knows how much the rest was dodged;" nor do I want them to know all my little secrets, for I could not divulge them if I could. They are not in my head, but in my fingers guided by my eyes.

Yes, there is one other reason why it is my pet process; because when I have humoured my negative and dodged my mould to my fancy I can set to work and print any number as near perfection as I choose. Not that I am ever satisfied; I always, no matter how good a result I get, either try again or determine to do so at the earliest possible opportunity.

Reader, do likewise; try again. Do not be satisfied till you feel you have obtained the best possible result, and still try again and let us make the lantern slide perfection. The conditions are all in your favour. Any developing process will produce really perfect results with proper care, while my mechanical process can only at the best approach perfection very nearly. I ought to have mentioned before that the slide which ran me closest was gelatino-chloride.

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TANDEM TRICYCLING AND PHOTOGRAPHY.

By S. Herbert Fry.

To those lovers of the art-science who like to have a flavour of photography in their annual holiday I can heartily recommend a tour on a tandem tricycle. On a suitable machine everything necessary for field work can be easily carried as well as personal luggage—the latter a very great comfort after a day's ride. The following short account of a trip during the past summer may interest some:—We (my companion and self) took with us an 8 × 6 camera and six double backs fitted with plates. Of course a folding stand was added to the equipment, and these, with a Gladstone bag, gave a weighty appearance to our turnout, but which we contrived to counterbalance by a light-hearted determination to enjoy our trip. I may mention incidentally that we on two occasions covered sixty miles as a day's ride, so the extra weight on the machine was well carried.

The trip was planned for ten days in the New Forest district, through Stoney Cross, Lyndhurst, Lymington, and Bournemouth, and back again through Ringwood and Winchester. The photographic opportunities were frequent, and it formed a most agreeable variation to the cycling to pull up at some attractive spot, unpack our apparatus, and make an exposure or two. That frequently involved the necessity of a pipe, while we inspected and examined the scene from various points of view. On our return through Alton hop-picking was in full swing, and we used our last plate there before pressing forward for Kingston. We rode one of Bayliss and Thomas's duplex excelsior tandems—a most comfortable machine for the purpose. It carries luggage well and travels easily.

One word of caution: choose a strong rider as companion, and induce him to ride in front. You will then see that he does a full share of the work.

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THE CHOICE OF A CAMERA.

By Andrew Pringle.

As the subject of cameras has occupied considerable attention during the latter part of this year, and as I have been at some trouble to study the matter, I propose to give, as my Christmas contribution to the Almanac, a few of the conclusions to which my study and inquiries have led me. As my photographic travels have brought me into places and circumstances where the efficiency of my apparatus has been at times severely tried, I venture to submit that I may speak not altogether without authority. It is highly important, especially for beginners and young hands, to know exactly what they should buy, what will entail extra and unnecessary expense and weight, and what features and appliances are essential to efficiency of working and ease in manipulation, so that I offer no apology for here briefly discussing the subject.

Certain points about a camera I consider absolutely essential; others I look upon as luxuries, though these luxuries not seldom conduce to good or rapid work. I shall "open the ball" with what I call essential or necessary features. I need not say that a camera must be made of well-seasoned wood, just as the wood for any fine woodwork must be seasoned. If the wood be not in a proper state there will be warpings, openings of joints, ingress of light, and disappointment. The bellows must be of leather and not cloth, and they should not, if conical, taper more than can be helped; I prefer rectangular bellows. The camera must have both rise and fall of front, and the more the better.

The dark slide must be very accurately made, and every precaution used to prevent the access of light to the plates. I have no hesitation in saying that more mischief is done by defective slides than by all other mechanical causes put together. A good dark slide ought to lie in the sun for half-an-hour without allowing injury to the plate inside. Often the shutter is so thin that light will impress a plate *through the solid wood.* The shutter of the slide should have a double hinge and a catch, so that when open there may be no flapping in wind and oscillation of the camera; and the hinge must be covered with material that will not affect the plates. Letters in THE BRITISH JOURNAL OF PHOTOGRAPHY during September and October, 1884, will show the importance of this caution. The shutter should close with a snap spring and not a piece of bent metal, which one often forgets to turn, and which may in time lose its hold and come away altogether. The division inside the double dark slide must be a fixture on hinges; must have good, strong springs to keep the plates in position; and *must* cover the whole of the plates, and not leave a margin so that light may shine during exposure through the ends of one plate on to the edges of the other. Monstrous as it may appear, I have often seen the division so made as to fog one plate while exposing the other.

A vertical swing-back I consider a necessity, and a side swing next door to it. Both of these swings ought to work on the centre. I think that perhaps the majority of swings work at the bottom or at one side. I admit, however, that in practice a swing from the bottom or from the side works well enough; and I must say that I do not remember seeing any camera, except one, in which both swings worked from the centre. But I would earnestly advise a beginner to buy no camera that has not at least the vertical swing. The motion may be made either at the back or the front of the camera, the result being the same, but it must be made somehow. For instantaneous work and for wide views, as well as for architecture under certain circumstances, a swing-back is absolutely necessary in my opinion.

In the matter of weight the buyer of a camera must be prepared to give and take. He must have absolute rigidity of all parts first, he must have the swing-back next, and having these he should possess a camera as light as possible. He ought to have a camera that will stretch to at least twice the length of the longest side of his plate, and that will close to the shortest possible distance from front to rear. I have a 15 × 12 camera that will open to thirty and shut to three inches.

he long groove into which the dark slide passes in the camera is freuently a nuisance, especially in larger cameras. The slides are very pt to stick in the groove and cause great trouble. This is easily emedied by placing one side of the slide in a groove and securing the ther side in its place by a spring; or there may be a little bit of rooving (say an inch). The slide is then placed nearly in position, ushed an inch to one side, and it is ready *in situ*. I have seen such rrangements frequently, and have no doubt they save much time and ouble, though at present I cannot speak from experience.

One of the luxuries I speak of must be prefaced by one of my necesties. It is necessary that the worker should be able to use his plate n the vertical, and that is done in two ways. The old and clumsy ay was to turn the whole camera on its side, and this was never with ny camera I possessed a satisfactory proceeding. Now, however, we ake our cameras square, and have what are called "reversing backs." y means of the reversing back we remove and turn the back of the amera, carrying round the ground glass, slide-groove, and all. The orking of this is perfect if the joints be good and the junctions light-ight, but it adds considerably to the price of a camera. For rather small ameras the old system works well enough, and to the impecunious or conomical purchaser I would say—"Do not reject a camera, otherwise atisfactory, for want of a reversing back." But without doubt it is a reat luxury to have such a back.

The focussing arrangements should be double if a camera of any size ver quarter-plate be used, and even with the smallest camera a rough nd a fine adjustment are to be recommended. The rough adjustment s done in a moment, and brings the view nearly to a focus; the fine djustment completes the business, and must work smoothly and quare. A camera should have few screws about it, and no *loose* crews at all. I strongly recommend to those who are apt to be in a urry, to those who have defective circulation of blood, and to those who like to do the thing well, Mr. Gifford's studded lens flange as escribed by me in THE BRITISH JOURNAL OF PHOTOGRAPHY for the ast year. Let the studded ring fit the largest lens used, and have dapters whereby all the lenses in use can be fitted to one flange.

A camera presenting all the features I have mentioned will probably e satisfactory, and my concluding advice to beginners is—Don't be 'penny wise and pound foolish."

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ON MOUNTING PRINTS.

By H. MANFIELD.

N mounting on bevelled-edged mounts, the prints look best when placed early up to the gilt edge; but, as every one who has had experience n this class of mounting knows, the difficulty lies in getting a perfectly-niform margin. Prints when wetted stretch very much, and it is, therefore, not an easy matter to trim them dry to the exact size, so I adopted the following method as an easy way out of the difficulty, and give it in the hope that it may be of service to some of the readers of the ALMANAC.

First: get a piece of sheet zinc about the thickness of a stout visiting card, have it cut the exact size which you require the finished print to be, and, of course, perfectly square and smooth. Next, procure a piece of three-quarter inch board cut from a lime tree or any other close-grained wood that is not too hard. Have it somewhat larger than the print and planed up quite true; this is the cutting block, which I find answers better than the usual glass plate. To proceed: soak the prints thoroughly in water, and make the surface dry by putting between blotting-paper; place a print whilst quite damp on the board, lay on the zinc-cutting shape, press it tightly, trim with a *sharp* knife, and mount the print at once in the regular way.

Trimming the prints when damp may be considered a somewhat risky proceeding; but it is not at all so, since the zinc adheres to the albumenised surface of the print, and the paper cuts with a clean edge and without tearing. Whilst on the subject of mounting I can recommend the following as a mountant which keeps well and is easy to use:—

Hard gelatine	½ ounce.
Water	5 ounces.
Methylated spirit	2 ,,

Soak the gelatine in the water till soft, dissolve by heat, and then stir in the spirit. Store in a well-corked bottle, and apply hot with a stiff brush.

THE LIME LIGHT.

By F. A. Bridge.

It is to be regretted that several serious accidents have occurred since your last Almanac in connection with lantern exhibitions, but it is still more to be regretted that so many articles have been written upon the subject in the various periodicals. They tell us little or nothing useful that was not known before, and have tended greatly to create and keep up a feeling of alarm and discomfiture on the part of the general public.

With regard to the ethoxo light I can say nothing. It may be a good light, but at present it seems so imperfectly understood that until it is quite under control it should certainly not be used for public exhibitions. With regard to our old friend oxyhydrogen, however, the case is different; the conditions under which it can be safely worked are well known (or ought to be) to every exhibitor. "Accidents," as they are miscalled, should be impossible. Explosions are always the result of either ignorance or carelessness; and a man who does not thoroughly understand the lime light, or who does not exercise a sufficient care in working it, should no more be allowed to publicly use it than a child should be permitted to amuse itself with a flask of gunpowder and a box of lucifer matches.

AN AMATEUR TO AMATEURS.

By William Adcock.

The time may come, and perhaps soon, when the exigencies of a professional photographer's business will induce him to extend it in a direction now generally neglected. There may be many (I only know of few) who, beyond artistic treatment of portraiture, study the art side of their pursuit. These few are greatly distinguished, and such work as Mr. R. Slingsby and Mr. H. P. Robinson produce has long been widely known.

It is, however, for amateurs at present to diverge from beaten tracks and, with means of leisure, good appliances, cultivated taste, and in many cases artistic training, show what can be done *in producing pictures.* Transcripts of landscape are interesting up to a point; but beyond that point I think they are less so than what may be got out of figure. Let amateurs turn their thoughts to grouping and their eyes to search for models; they will get pleasure in doing so.

I recommend not so much the fixing upon a subject, and the search for models for producing it, as a habit of looking out for picturesque people, and then determining what can be done with them. Every town and village yield material for the student. They have their butcher boy and baker boy, their ragged urchins in the streets, and the prim old butler at the hall. There are the picturesque shepherd, his colley, Mary Jones the pretty housemaid, and Tommy Atkins ready for enlistment. Itinerant pedlars and "vagroms" full of character abound. By coaxing or by paying all these people may be got to sit. But then comes the rub—how? Certainly not for their portraits, but for what they can be made to be doing. It is the amateur's business to study and manipulate them to what is wanted. He must first know clearly himself and then make them understand his wishes. For those who, not having done so already, will adopt these lines of practice I can promise pleasures in photography which I believe no other phase of it is capable of rendering.

On the 3rd of October I have taken five negatives on 15 × 12 plates. My models have been a handsome boy of six and a girl of thirteen—both the children of gipsies. The resulting pictures I call *A Poacher's Heir*, *A Tambourine Player*, *An Arab*, *A Flower Girl*, and *At the Edge of the Covert.* They are not all bad, but plenty of amateurs if they tried would "beat them into fits!"

◆

USEFUL RECEIPTS FOR A DEAD BLACK FOR METAL AND WOOD.

By Rev. H. B. Hare.

The first (as taken from my note-book) which I shall describe is for metal. It was given to me some years ago by a working optician, and is serviceable for diaphragms, hinges, any brass or metal work connected with the camera, lens mounts, or double backs that will not be injured by heat. Make a strong solution of nitrate of silver (say 200 grains to the ounce of water) in one vessel, and in another vessel the same proportion of nitrate of copper. When dissolved mix the two together. Having thoroughly cleansed the metal article from all grease and dirt, polish it with a dry chamois leather, apply the mixture with a camel's-hair brush, and *heat evenly* before a fire until the required degree of dead blackness is obtained.

The second is for wood—the inside of cameras, double backs, &c. Procure from the chemist two bottles—one containing tincture of nut galls and the other muriated tincture of iron. With fine sand-paper clean the wood thoroughly from all grease, dirt, and varnish. Rub it over with a soft brush or tuft of cotton wool dipped in the nut galls, and let it dry. When dry dip another tuft of cotton wool in the tincture of iron and again rub it over, when it will assume a beautiful and lasting dead black.

The third is for either metal or wood. It is not so durable, but still for certain purposes when one cannot apply heat, or possibly is in a hurry (drying as it does almost immediately), is very useful:—

Lampblack	1 ounce.
Methylated spirit	8 ounces.
Shellac	1 ounce.

Dissolve the shellac in seven ounces (out of the eight) of the methylated spirit, and with the remaining ounce *incorporate well* the lampblack in a mortar, adding the spirit a little at a time. Apply with a soft brush.

PHOTOGRAPHIC EFFEMINACY.

By J. S. Pollitt.

If Washington Irving's hero of the Katskill Mountains had been a photographer at the time of his adventure in "Sleepy Hollow," and his subsequently prolonged trance had terminated only within the last two or three years, his surprise, on awaking to surrounding realities in the vast changes which had taken place in his profession, would probably have been such as to have induced entire unconsciousness to all the bodily pains and penalties which would be the natural result of an uninterrupted exposure to the accumulated severity of weather changes included in twenty consecutive years.

The marvellous advances which within the last ten years have been made in perfecting processes as well as in the simplification of apparatus, lenses, and the like cannot but be eulogised, and their continuation vigorously encouraged by every right-thinking person who realises and appreciates the fact of living in an age of progress, even if he do not sniff in the dim future the period when the art-science may be so far freed from its vagaries and complications as to be designated "photography made easy for the million."

All this is highly commendable, but, as in most mundane pursuits, brilliant successes are invariably accompanied by certain drawbacks which, to some extent, dim their lustre, so in the pursuit of photography may it not be possible? Rather, may it not be probable that in the present excitement and craze for rapid exposures and automatic processes the substantial groundwork of former years is in some danger of being relegated as so much antiquated and obsolete matter to the domain of oblivion.

Why, in this connection, I would ask, in the last edition of one of the very best standard works ever produced on the subject of photography, has the editor chosen to cut and carve away about one hundred pages of text, which in previous editions were devoted to a description and elucidation of the earlier dry processes, all of which were well worth remembering, if for no other reason than their educational value? Many of them, however, were capable of results which for perfection and delicacy have never been, and probably never will be, surpassed by the most approved of modern processes.

It is quite true that, by way of makeweight for the omission, several processes of recent introduction have been well and fully described. This is, of course, praiseworthy, although not a whit more than ought to be done in the writing up to date and reissue of any good scientific text-book. At the same time, it is positively culpable to leave so much that appertains to the earlier stages of photographic work, and which has played so important a part in leading up to the present manipulatory methods, unrecorded.

In my humble opinion—and I express myself with all deference to the literary and experimental talent which has hitherto been at work in popularising the charms of photographic art—it still remains for some able and painstaking genius to produce a standard work, comprehensive in its character, and minute in its details, beginning at the latest with the crude experiments of Wedgwood and giving both the particulars and *rationale* of every subsequent practical process down to the very last modification of the latest progeny of the art-science. "But," say some, in reference to the above arguments, "the photography of the present day is reduced to such a degree of simplicity that it would be unwise to puzzle the brains of its devotees with a lot of defunct and complicated formulæ." To those who take up the pursuit "for the fun of it," after casting about in the region af playthings for some new excitement, it may be so; but to the "muscular" student' who goes below the surface to seek out the "why and wherefore" of things, a complete historical and scientific knowledge are as essential to satisfy the cravings of his genius as an intimate and practical acquaintance with . . . is to the . . . is twelve books of Euclid to the philosopher or the rhetorician.

The title I have chosen as a subject for these remarks has been suggested by reason of thoughts which have been revolving themselves in my mind at various times within the last few years, seeing that the tendency of most new beginners during that period is to try to float on the water before they have learnt to swim, while the boast of the life-long practitioner, now not unfrequently heard, is of his entire forgetfulness of much of his former manipulatory skill and cunning under the all-absorbing influence of gelatino-bromide processes.

Do not imagine, gentle reader, that I am underrating the importance of a process in which, by almost universal consent, have been recognised the cardinal features of an utopian system in photographic art, or that I am seeking indirectly to inpugn the work of the present day as having deteriorated in any phase of excellence when compared with the results obtained by more primitive methods.

I do think, however, the present an opportune period for raising the question whether the facilities for the cheap and easy practice of photography in the shape of commercially-prepared materials of almost every description, now so readily obtainable, have or have not a distinct and a direct tendency to weaken the stamina, from a scientific point of view, of the enthusiastic operator, who, captivated with the results attained by pursuing a prescribed and merely mechanical routine, is naturally lead away from the more profound study and experimental research which characterised the earlier students of photogenic science.

No one in his senses, I should imagine, would deprecate the high state of development which the commercial production of photographic material has at present attained, and is likely in the future to attain; but I have been struck with the fact that, of the immense influx of disciples which the aforesaid facilities have tempted into our ranks during the last four or five years, how really few there are—so far at anyrate as my own observations have gone—who know or even care to know anything beyond or below the mere superficial practice of the exposure and development of a ready-made gelatine plate. Such a state of things may be satisfactory from a manufacturer's point of view, but I submit that is a condition which every lover of the art-science ought to labour to correct, and which I am pleased to think that photographic societies at all events are so correcting by bringing at frequent intervals before their members scientific experiments and demonstrations illustrative of the earlier and more useful processes in such way that we may at least hope there will be no danger of their becoming lost arts.

If the influence and interest of the numerous societies should ever become such as to succeed in establishing for photography a chartered institution, as has been fondly hoped by some would in course of time be realised, in which students could enter themselves for examination with the prospect of honours, diplomas, or other forms of distinction, it is to be hoped that the prescribed forms of training for the various grades of merit shall include a profound knowledge of the history of photographic chemistry from the discovery of the properties of horn silver by the alchemists to the publication in 1839 of the beautiful though widely-dissimilar processes of Fox Talbot and Daguerre, and from that period down to the living present a scientific and a practical mastery of every efficient and workable process.

In conclusion: let me urge on all who pursue the practice of photography either from love or necessity not to rest satisfied with the acquisition of just sufficient mechanical skill to repeat the results of other men's brains, but let each seek to unite with the most perfect manipulatory skill the profoundest scientific knowledge.

The occupation of the unskilled labourer is as necessary in commercial economy as the highly-trained mechanic, but which has the greater merit—the lout who blows the bellows, or the artisan who shapes the metal?

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TRANSPARENCIES FOR THE LANTERN.

By George Hadley.

During the last two or three months there has been a great deal said and written on the above subject, which will, no doubt, induce many at this season of the year to try their hands at making slides from negatives taken in the summer.

The constantly-increasing use of the lantern, both for lectures and exhibitions, make it one of the chief attractions for the winter season.

A few weeks ago I had a commission to make some slides for a lecture. I tried both chloride and bromide plates, and after much patience and perseverance decided to use the latter. I tried several developers, and was some time before I could get clear glass in the high lights and density enough in the shadows at one development. When I succeeded in getting these the colour was not all I could wish, but with a little alteration in the mixing of the solutions I was pleased to find that satisfactory also.

Now for the formula, which, if properly used on a good plate and negative, will produce a slide equal to any I have seen:—

PYRO. SOLUTION.

Pyrogallic acid	1 drachm.
Citric acid	45 grains.
Bromide of ammonium	1 drachm.
Water	2 ounces.

Dissolve the citric acid first.

AMMONIA SOLUTION.

Ammonia, ·880	1 ounce.
Water	4 ounces.

To develope a quarter-plate, take—

Water	1 ounce.
Pyro. solution	1 drachm.
Ammonia solution	1 ,,

Wet the plate as usual, pour the above over, and let it remain on the plate for a minute or two. Take another drachm of ammonia solution, and add a drop or two at a time. Wait a few seconds between each addition until the picture begins to make its appearance, after which do not add any more ammonia. The development will gradually go on until you have a beautiful transparency, right both in colour and density—that is, if the development be stopped at the right time, for it will get too dense if left in too long.

Wash and fix in clean hypo., soak in the usual citric acid and alum solution for a few minutes; then I have no doubt but that you will be pleased with the result. Do not over-expose.

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THE PRESERVATION OF THE EYESIGHT OF PHOTOGRAPHERS.

By W. H. HARRISON.

DURING the year 1884 much attention has been drawn to the fact that a pure red light is not the best in which to develope gelatine dry plates, and Mr. W. E. Debenham called general attention to the possibility of improving developing-room illumination by himself producing an excellent light for the purpose. This led me to inquire experimentally into the reasons for the conflict of opinion about different lights, and to give the following explanation of the fundamental error of the past, viz.:—That when gelatine plates were found to fog in a light safe enough for developing wet plates, recourse was erroneously had to selecting a light closer to the extreme end of the red of the spectrum. The proper course would have been to have lowered the intensity of the yellow, a half-power yellow being much brighter to the eye than a full-power red, the intensity of the original source of light remaining the same.

The same amount of intelligence and care which is devoted to developing a dry plate is rarely brought to bear in selecting and using the best light for the developing room. Pieces of red glass or orange paper are fixed in the window, and there is an end of the matter; consequently, the light in the developing rooms of even most experienced photographers is commonly several times less than is advantageous.

The first step in the path of improvement is to do away with variable daylight as the initial source of light; for, if development be safe when the variable light is strongest, at all other times the operator must be working in a much worse light than is necessary. The source of light should either be a candle always of the same make, or a gas flame turned to the same height, where more scientific uniformity is not readily obtainable. The hardest white stearine forms a good, slow-burning candle. There are several varieties of stearine candle in the market, and their relative hardness is a rough guide to the inexperienced purchaser as to their quality. The light from a paraffine flame is more rich in blue rays, so had better be avoided; besides, with lamps there is no security that the flames are of the same size at different times of using. The light of all flames varies with the pressure of the barometer, but not much.

There may be two sources of safety in the lantern window, namely, translucency and colour. A translucent white screen virtually reduces the intensity of the whole light; it also reduces the intensity of the violet and blue rays in rather greater proportion than the others. Translucency is a great element of safety, and it accounts for the popularity of the paper called "true canary medium," which would give very bad protection if that protection depended alone upon its faulty colour, which even permits blue to pass when the initial light is moderately strong.

An excellent screen for a candle flame consists of two thicknesses of the brightest yellow tissue paper, purchased in a shop possessing a large assortment of different yellow samples from which to choose. The paper should not be of an orange colour, which will be found by the spectroscope to cut off some useful green; it also should not be of a light primrose colour, which would transmit too much blue. It should be a gorgeous yellow. The lantern window must not be a small one; about nine inches square should be the minimum when the plates are to be developed about two feet from the lamp. The candle should be five inches behind the screen. The two sheets of paper must only be pasted together at the edges, where they are fixed to the lantern. Any gum or other substance which makes them less translucent and more transparent where the light shines through them is very dangerous. With a stronger light in the lantern, such as that from a gas flame, it would be well to use three thicknesses of the yellow tissue paper, but much depends upon what distance from the lantern the plates are to be developed.

It is not for one moment asserted that plates would not fog if exposed for five minutes six inches in front of such a lantern screen, though that fogging will be infinitely less than those who have not tried it would anticipate. A plate developed with ordinary handling in a dish two feet from the screen experiences nothing approximating to so severe a test as this, owing to the most valuable law that the intensity of light varies inversely as the square of the distance from its source. Additional safety is due to the facts that the plate is not kept parallel to the luminous screen, and that it is somewhat protected from the action of light by the layer of developing solution.

The same lantern may sometimes fog one plate and not another, from a cause hitherto unheeded. The candlestick holding the candle must always be at exactly the same distance from the screen, otherwise unsuspected irregularities may creep in. For instance: supposing the candle flame to be six inches behind the screen when developing one plate, and four inches behind it when developing the next, either the latter plate will be fogged or the first one was developed in a worse light than was necessary for safety. The simple variation of two inches in the position of the candle would cause the screen to be a little more than twice as brilliantly illuminated at the four-inch distance as it was at the six-inch distance. When a paraffine lamp is used, and placed haphazardly on any part of the lantern floor, then in addition to the great irregularities introduced by varied position will be the irregularities due to variation in the size of the flame every time the paraffine lamp is freshly lighted. A candle is tolerably free from this defect, since no hand regulation of the size of the flame comes into play.

A bright light, like a very sensitive plate, demands some intelligence in the user; that is to say, a man who knows the principles on which he is working, and has ascertained by experiment the fogging power of his light at varying distances, can develope in a brighter light than one who works by rule of thumb. A safe plan is to remove the plate from the slide and put in the dish at not less than three feet from the lantern, and to bring it nearer as development proceeds. When the plates are extraordinarily sensitive it is but necessary to develope them a little farther from the lantern, since the fogging power diminishes enormously with distance. At three feet distance the fogging power is nine times less than at one foot distance.

Mr. Debenham uses a compound yellow and green screen—the former of thickish paper, the latter of slightly-coloured glass. I have found one sheet of yellow tissue paper and one sheet of green tissue paper to be of use; but great care is required in selecting the green, most of them being exceedingly unsafe, and the darker varieties cutting off useful light. They all cut off some of the red rays which come through plentifully with the yellow when yellow paper alone is used. The best green tissue paper for the purpose is a very bright sea-green, something like the advertisement cover of the *Graphic* newspaper, which, however, is rather too blue.

With a much brighter light in the developing room, and a dark end to the glass studio, so that the operator does not so suddenly submit his eyes to extreme variations of light and darkness in passing from the one to the other, good eyesight may possibly be preserved years longer than would otherwise be the case.

Tissue paper is faulty, uneven stuff; so, indeed, are all the translucent fabrics in the market for photography. Their colours also are not perfect, but are bought and used empirically; still, for practical purposes, we must for the present take what we can get. Some day, perhaps, brilliantly-coloured oiled silks of even translucency and colour throughout may be introduced into the market. At present I am working at experiments with almost perfect films of the purest and brightest colours obtainable, used in conjunction with even films of pure translucency, to find out what can be done by devoting the same care to the optics of developing-room illumination which is given to the development of negatives; for, to the photographer who wishes to save his eyes, care and intelligence are as necessary in the one case as in the other. Carmine and fluorescine have been found by me to be among the most useful colours for the purpose. How they are applied, and what their spectroscopical advantages are, will be seen on reference to my articles on the subject in last year's BRITISH JOURNAL OF PHOTOGRAPHY.

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AMATEURS IN THE UNITED STATES.

By HARRY PLATT (Nantucket, Massachusetts.)

WITH us amateurism is at full tide, and everywhere one goes he sees a camera, and sometimes several, planted before some "choice bit." This is not greatly to be wondered at when one remembers that our stock-dealers do more to encourage amateur than professional trade. Their argument seems to be that the regular, established photographer is obliged to use a certain amount of material each year, and naturally he will buy it from the dealer with whom he is acquainted; but amateurs are not obliged to purchase anything unless they take a notion to, and then they will buy a little from this man or from that, where it is most convenient, unless some particular one offers them an inducement to buy exclusively from him.

This inducement usually takes the form of a liberal discount; in some instances it is an extra dozen of plates, or something of that sort, thrown in. This fact is carefully guarded from the professional, because, although publicly they deny it, most photographers who come in contact with them feel that amateurs, as they run in America, are a growing evil and an increasing injury to business, particularly that of view photography. We are indebted to many eminent amateurs of England for some of our most valuable processes, but, except in three or four instances, I do not remember that any American amateur has ever been of much benefit to the photographic world.

The reason of this is obvious. While the English amateur works for the love of the science, the American works for what he can make out of it. Science is no good to him unless it can be reckoned in dollars and cents. It is true that Mr. Newton and two or three such men are fine photographic chemists and have benefited us very much, but they are of the class who work for the love of it. The greater number have no ambition beyond starting a sort of amateur business, as it were, and striving to see how much of some photographic trade they can get for themselves. As they have no gallery rent, and in many States no business tax to pay, they can and do make photographs at very much less than anyone could afford to do who has to make his living at it, and many of them do work which is really good.

Now, I do not believe anyone would object to fair competition. The fault is not that; it is the manner in which amateurs cut the prices below living rates. As an instance let me mention a photographer whose business part of the year takes him to a certain summer resort where he makes and sells views, and, because of competition from other photographers who also go there, he has to sell his views very low indeed. Well, it happened recently that he became acquainted with an amateur photographer, and finally invited him to visit this summer resort. The amateur came and they had a few days' outing, which was very pleasant. During that time the photographer learned to his astonishment that the amateur bought all of his chemicals, paper, and plates at very much lower prices than he could. Later he found out that his friend after returning home was actually trying to sell the same views to his customers at nearly one-third less than he could afford.

A short time ago I was talking with a young man who had come to me for some information about photographing. "And now after you have learned to be a really good photographer what use will you make of it?" I asked. "Oh," he answered, "I shall make views where I live and photographs of residences. I can get lots to do because I will not charge as much as the photographer there." One other amateur that I know, who is engaged in a business which allows him considerable time for recreation, does about five hundred dollars' worth of photographing a year, which he gets by undercutting the local photographer. I have sometimes had him to purchase stock for me, because he could get lower prices as an amateur than I could as a professional.

This condition of things is bad for both; but it is the natural result of several causes, chief among which are—first, every American boy is taught—either by actual precept or by the example of others around him—that money is the one great aim of life; second, that easy American conscience which allows money to rank higher than honour; and, third, the unfair means by which stock dealers cater to the amateur trade. Sooner or later this must result disastrously to photography in the United States. The only places where it does not seem to be working evil is in those States where professionals have a heavy business license to pay; and, unless an appeal to the honour of all amateurs has the effect of lessening the evil, this business tax seems to be the only protection left us.

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A FEW NOTES ON LENSES.

By J. Vincent Elsden, B.Sc. (*Lond.*), F.C.S.

Position of the Diaphragm.—With a single lens there is to be noticed a great difference according to the position of the diaphragm in front of the lens or behind it. Thus, if in front, the distortion would cause the image of a square to appear barrel-shaped, since the corners would be formed by the margin of the lens, and would, therefore, be more strongly refracted than the centre of each side. When the diaphragm is behind the lens the distortion is reversed, since the image is not formed by the same portion of the lens as before. If, therefore, a lens is placed on each side of the diaphragm the distortion is neutralised. If a doublet lens be unscrewed, as is often the case for the purpose of obtaining a longer focus, this distortion will no longer be compensated. The amount of distortion also depends upon the distance of the diaphragm from the lens, least distortion occurring the nearer the lens and diaphragm are together. On the other hand, the greater the distance between them the flatter the field will be. Again: there is a certain position of the diaphragm in which its image will coincide with the focus of the lens and produce a flare spot. These considerations are of importance in all cases in which combinations are used singly, and may also affect the use of certain kinds of instantaneous shutters when used in front of a lens; for these are sometimes equivalent to a diaphragm.

Portrait and Landscape Lenses.—Many amateurs possess but one lens, with which every kind of subject is attempted. Perhaps it will be useful, therefore, to explain the main points of difference between portrait and landscape lenses. In a portrait lens the main object is to obtain a sharp image of a number of points—all near the lens, but lying in different planes. A single lens is useless on account of the distortion which it would produce. It is found best to use combinations separated by so long an interval that only a small field is covered. For landscape work, on the other hand, it is necessary that a wide angle should be embraced, and that distant objects should be sharply defined. Distortion would in this case be scarcely noticed, so that single lenses might be employed, except for architectural subjects.

Inequality of Illumination.—Wide-angle lenses frequently show a great falling off in the illumination of the marginal parts of the picture. This is partly owing to the rays of light entering the lens obliquely from the marginal portions of the landscape, and partly on account of the diminution in size of central portions of the picture compared with equal areas on the marginal parts. The late Mr. Dallmeyer estimated that when the angle of view is 40° the extreme margins only receive eighty per cent. of the light falling on the centre, while when the angle is 70° the marginal illumination is less than one-half that of the centre.

Depth of Focus.—One of the great difficulties of landscape photography is to include foreground without any appreciable want of sharpness. This is best done by using a small diaphragm, since depth of focus increases with the diminution of aperture. Captain Abney gives the following formula for determining approximately the nearest point which will appear in focus when the distance is sharp:—The distance of the nearest sharp point (in metres) = ·41 × the square of the focal length in centimetres × the ratio of the aperture to the focal length; from which it is seen that a short-focus lens will give greater depth than one of long focus.

False Perspective.—Simple distortion causes curvature of straight lines and makes circles appear elliptical, but these are not strictly errors of perspective. No photograph can convey a true impression unless the eye be placed at a distance from it equal to the focal length of the lens employed in its production; hence short-focus lenses appear to give very false perspective, since the picture cannot be viewed sufficiently close to the eye. Very short-focus lenses exaggerate the size of the foreground in proportion to the distance, and very long-focus lenses exaggerate the size of the distance. Abnormal results are also produced by a wrong choice of position, especially in photographing lofty buildings in narrow streets.

A FEW HINTS ON PRINTING.

By G. Mansfield.

Many photographers, especially amateurs, imagine that when they have secured a nice-looking, clean negative their work is finished, and seem quite to forget that a very great deal depends on how the printing is done. There are, indeed, few negatives that may not be improved by judicious masking and shading, and many that without this never give anything but useless prints. I am, of course, speaking of landscape negatives, as the retouching and printing of portraits is an art in itself, and quite beyond the sphere of most amateurs.

It may, of course, be said that a really perfect negative only requires to be put in the frame and exposed to light, and that our aim should be always to produce such negatives. My reply is that these "absolutely" perfect negatives are rarely met with in practice. In fact, how few views are there in nature that at any one hour of the day are perfectly lighted in every part? and how often does the photographer find it impossible to be on the spot even at the moment when the lighting is at its best? How often, again, is some delicate effect of light, which gives the principal charm to the landscape, lost by over- or under-exposure? We must then make up as much as possible for the inevitable shortcomings of our art by the intelligent and careful printing of our negatives.

The first improvement that almost all prints require is the addition of a suitable sky, or, at least, a few clouds. Should the picture be over 8½ × 6½ it should *never* have a plain white sky. Should the horizon be low a marked and brilliant sky often adds pictorial quality to an otherwise uninteresting picture, and even where the sky is much obscured by branches of trees a few clouds made to show through them produce a charming effect and give relief to the picture. Of course in every case careful selection is needed to make the landscape and sky suit each other, the direction of the lighting being carefully observed.

Having selected the sky negative in harmony with the picture, the printing of it is a comparatively easy matter. The first requisite is to secure a white sky in the print, and as a great many of the best negatives are not sufficiently dense it will be necessary, if very weak, to paint out the sky. If, however, they are only very slightly so—as a good negative should be—the simplest plan is to mask out the sky with cotton wool, which must be laid on the glass of the printing-frame, following with the edge of the wool the outline of the picture, which is generally fairly visible when the white printing paper is behind it. Should it, however, be difficult to follow, as it sometimes is in intensified negatives, it is a good plan to place the negative against the window and mark the outline on the *back* of the glass with a few light dots in indian ink; they will, in all cases, much facilitate replacing the mask in position after opening the frame during the progress of the printing.

A very good thing to place over the cotton mask to keep it in place, and prevent any light filtering through the thin parts of it, is a piece of thin, *rough* board. The cotton adheres to it, and it can be lifted on and off without disturbing the form of the mask. A little shadow appearing here and there round the outline makes no difference, as it is softened off by the cotton and blends with the clouds in the finished picture.

To print in the clouds: procure a very smooth piece of hard wood or a piece of plate glass something larger than the print, and cover it with coarse flannel sewn tightly on. On this lay the print, previously trimmed, place the cloud negative in position on it, and pass over the whole an elastic band to keep them in position. Take it into the sun and expose for the necessary time, which will depend on the density of the cloud negative, and should be as short as possible. The rest of the picture should be covered over with a cardboard mask, which is kept slightly moving to prevent a sharp outline. Make a separate mask for each negative, with the name on, and put it away with the negative. It saves time in the end, and, what is more important, prevents many a print being spoiled by using some makeshift. The mask need only follow roughly the outline of the print. Single dark objects, such as branches of trees, spires, &c., need not be covered, but light, distant mountains must be shaded if we do not want to produce an effect of clouds covering their tops.

A great many negatives are much improved by the deepest shadows being slightly shaded during printing, and nothing is better for the purpose than tracing paper cut out to cover the part that prints too deep, and fixed with two pins to the side of the printing-frame. If it blow about a little with the wind so much the better, as this softens the outline. For parts that print very dark thicker paper may be used. If the shading be required in the centre of the picture the best plan is to do it with a little Indian ink lightly stippled on to the glass of the printing-frame.

A last hint: if you are *obliged* to print from weak negatives do not attempt to tone your pictures beyond a warm brown.

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MICROPHOTOGRAPHS IN THE STEREOSCOPE.

By J. Thomson, F.R.G.S.

One of the most interesting phases of microphotography is the production of stereoscopic effect by combining two microphotographs taken under different conditions of light.

Perhaps the simplest and most certain mode of compassing this end is the following:—Take an ordinary microphotographic camera attached to a microscope, and the source of light an Argand lamp placed in front of the object-glass, with the instrument in a horizontal position ready for work. The object selected for enlargement may be a transverse section of wood, whose enlarged image shall occupy the space of a stereoscopic photograph. After the operator has taken a negative, before proceeding to secure a duplicate he must re-adjust the light by moving the Argand lamp two or three inches to right or left, in a line parallel to the stage of the microscope. A twin negative must now be taken. The only difference between the two impressions is that the shadow is thrown to the right in one and to the left in the other. Prints from these negatives, mounted on a stereoscopic slide, produce the effect of relief or intaglio alternately by changing the relative positions of the prints from right to left and left to right.

In the case of an extremely-minute microscopic object—a diatom, for instance—who can determine its true form? Who can say whether it is convex or concave? By a slight alteration of focus it may appear under the microscope first one and then the other. This objection has been raised by microscopists to microstereoscopic photography. It appears to me that doubt on this point may be set at rest by selecting a microscopic object of known form, such as a section of sugar cane, or a crystal standing in relief from the glass slide.

Twin impressions of such objects—first with the lamp on the right, and second with the lamp on the left—will only produce relief in the stereoscope when mounted in one position on the stereoscopic slide Reverse the position of the prints, and the result will be intaglio. If, then, one observes the precaution of marking the negatives "right light," "left light," and the same rule as regards their relative positions on the slide, the result will be a summary of the true form of the object in the stereoscope. Minute objects, about whose form there may be doubt, should thus be forced to yield up their secret, and so contribute to the advancement of science.

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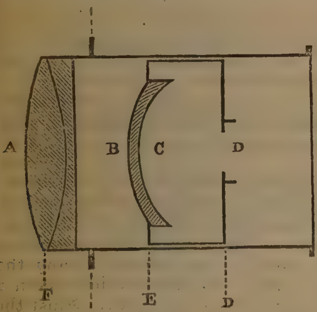
BI-LENS FOR FIELD WORK.—A SIMPLE MEANS OF ENLARGING AND FLATTENING THE FIELD.

By Thomas Furnell.

As the subject of field lenses may interest some, and more especially those possessing an ordinary single view lens, an easy method can be adopted to flatten and enlarge the field, and by sharpening the focus a larger stop than usual can be used with equal, if not better, definition. The following diagram will show the means of effecting this, provided the lens mount has a shifting or sliding stop. A is the usual plano-convex achromatic lens. B C a convexo-concave lens, which must be fixed to the stop so as to travel with it when the latter is pushed in or out. The radius of the curve B is to be four times the focal length of the lens A, and the curve C to be made sufficiently deep to give a negative focus of ten per cent.; that is to say, to lengthen the focus of A one-tenth. Temporarily fix these two lenses to ascertain the focal length they give when focussed on an object at the usual working distance—say about one hundred yards off; then fix in the small lens B at a distance between E and D equal to one-tenth of the then ascertained focal length between A and the ground-glass screen. Then, if the stop be drawn out to the end of the tube, and an object be focussed at the *centre* of the ground glass, it will be seen that the field is round as usual; but if the stop be gently pushed in the definition will gradually extend until the whole of the screen is covered quite sharply, and absolute flatness is obtained.



If the pushing in of the stop be continued the field becomes concave, and so loses the definition at the sides as at first. Now draw out the stop until the point is again reached that gives absolute flatness, and if the distance between F and D be carefully measured it will be found to be as near as possible one-fifth of the then existing focal length between A and the screen. If during this operation a stop be used equal to $\frac{f}{30}$ (measured from the stop), it will be found that a much larger stop can be used with an equal definition as would be had with the smaller stop when used without the small additional lens. It must not be expected that the small lens B will cure any of the distortion. It cannot do that, for its functions are simply to flatten and extend the field. An ordinary spectacle lens is sufficient if one can be obtained with curves anything approximating to the curves required; but the same care must be observed as to its being placed a distance from the stop equal to one-tenth of the focal length, as before mentioned.

It will be useless trying a double-concave lens in this case, as it will not suit. It simply lengthens the original focus and causes a kind of diffusion of focus beyond a certain radius. It is possible that a plano-concave lens with its flat side towards A might act, but I have not tried it, and so cannot speak from experience.

◆

ENLARGED PAPER NEGATIVES.

By H. Norwood Atkins.

Late this autumn I tried an experiment I had been planning for some time, namely, the possibility of using argentic-bromide paper for enlargements from small negatives, and as it succeeded to the satisfaction of some very critical photographers I give the particulars in brief.

I took a transparency by contact from a negative of the gateway to Beaumaris Castle—a bright, sunny-looking picture, sharp and full of detail, taken on a very wet day. The transparency when dry was placed film inside in an aperture cut in the screen, by which I convert my bath room into a "dark room." The sun was shining directly into the room, and between the transparency and the sun I placed in the groove which held the transparency a piece of ground glass, ground-side out.

In front of the transparency a platform, consisting of a piece of board four feet long and twelve inches wide, ran into the room. On this I placed the camera, with the open back covering the transparency and the lens pointing into the room. On the platform I fixed an upright easel, which was capable of sliding to and from the camera, with a 10 × 8 printing-frame attached to it. In the printing-frame I placed a sheet of white paper, and focussed with great care the image projected from the transparency through the lens (a rapid symmetrical). Here I may remark that the movement of the lens determines the size of the picture, and the movement of the easel simplifies the focussing.

When focussing is completed the lens is capped. The printing-frame is lifted out of its place, and instead of the white paper a piece of Morgan's argentic-bromide paper eight inches wide and rather more than ten inches long is substituted. The simplest way to accomplish this is to lay a square of glass 10 × 8 on the unsensitised side of the paper, fold back the projecting ends over the glass, and lay it in the frame, sensitive surface outside and glass behind. The back of the frame is placed behind that again, so that the sensitive paper is exposed to the image without any intervening glass.

In bright sunshine the exposure will vary from one to three minutes according to the density of the transparencies and time of day. No instructions can be given on this point. After exposure, lay the argentic paper in clean water to expand. Develope with the following formula:—

Washing soda	1 ounce.
Water	10 ounces.
Bromide potass	8 grains.

To each ounce of this add pyro. one grain. Three ounces will develope the plate well. Less may be used, but staining occurs more readily. If the reader will use his pyro. in the following form it will keep beautifully clear and clean:—

Pyro.	30 grains.
Sulphite (not sulphate) soda	120 grains.
Water	30 drachms.

When development has been carried out fully the paper is rinsed and laid in a saturated solution of common alum for some time. This improves the colour and prevents frilling.

Again wash and fix in ordinary hypo., and, after an ample washing, the negative is ready for waxing, which may be done by passing it through paraffine wax or a melted paraffine candle at as low a heat as will enable it to penetrate the paper. Ironing afterwards spoils the negative. Simply warm it with a soft cloth and rub off the surplus wax, if any. Paraffine cools instantly, and does not soil the albumenised paper in printing.

A negative of this sort prints very rapidly, and is perfectly free from granularity, if the original negative be not granular. I have tested it up to five diameters, but I prefer a smaller magnification.

◆

VENTILATION OF THE DARK ROOM.

By P. H. Emerson, B.A., M.R.C.S., &c.

The three great requirements for perfect health are—pure water, pure air, and a pure subsoil. From the photographer's point of view pure air is probably the most important, as he is much confined in the ammonia-vitiated atmosphere of his dark room. The chief diseases engendered by impure air are—a low state of health without any particular disease, indigestion and lung diseases, especially bronchitis, pneumonia, and phthisis. The impurities which give rise to these diseases are either—(1) suspended matters, such as fungi, particles of dust, fibres of textile fabrics, epithelial cells, and, above all, the moist organic substances given off in the breath; or (2) gases, of which carbonic dioxide is the chief.

The effect of breathing air is to take away from it its oxygen and to load it with CO_2, organic matter and aqueous vapour. The amount of CO_2 in pure air is 0·4 volumes in 1,000, and a man at each breath loads 500 c.c. of air with CO_2 to the extent of four per cent. It is thus very plain that the air will quickly become deleterious if not changed; for, when the CO_2 reaches 0·7 volumes in 1,000, the moist organic matter is found, and thus the CO_2 becomes the measure of this poison in the air, the CO_2 itself being a minor element of danger. Dr. de Chaumont has calculated that when the air of a room smells "stuffy" the CO_2 has reached 0·6701 per cent., and, when "very close," 0·954 per cent.; and "stuffiness" should, therefore, always be regarded as a danger signal of grave import. From various data it has been calculated that a man requires 4,750 cubic feet of pure air per hour when doing light work. As a photographer's air is vitiated by ammonia, 5,000 cubic feet per hour is not a foot too much. The object of ventilation is to change the air in a given space sufficiently quickly to keep it pure, and yet not to cause any draught. Say the cubic space of a given dark room is 1,000 cubic feet, the air will, therefore, have to be changed five times in an hour to keep it healthy. With the best mechanical contrivances a room with a cubic space of 600 cubic feet can be perfectly ventilated.

As probably the cubic space of most dark rooms is not 600 feet, it is evident how perfect the ventilation should be. The only step, then, for a man who is confined much to the dark room is to put the matter into the hands of an able sanitary engineer, and to have his dark room as perfectly ventilated as possible. This cannot be done too quickly, nor can it be too strongly insisted upon; for, apart from the days lost by ill health and the diseases already mentioned, there is not the slightest doubt but that impure air, coupled as it generally is with little exercise and indigestion, is a great cause of consumption. This fact has been proved beyond dispute by observations made in prisons, houses of correction, barracks, and men-of-war in different parts of the world. In our own army the death-rate from this disease fell to an extraordinary extent when greater cubic space was allowed to each man.

◆

ON THE BLISTERING OF ALBUMENISED PAPER.

By G. H. E. Sutton.

One of the crying evils in modern photographic operations is the blistering of albumenised paper. The time was when this was an unknown quantity in the calculations of a printer; but now he is a lucky wight indeed that is not, occasionally at least, brought almost to his wits' end by the startling phenomenon of a batch of prints literally smothered by this unwonted pest.

Much ink has been shed, and many theories have been born into the world, in the attempt to account for these abnormal productions. I have no new speculations to bring forward, and will only say that the real cause of their appearance seems as yet to be uncertain in the minds of those who have paid attention to the subject. If the evil could be run to the earth, not only might an unfailing preventive be always at hand, but, better still, such a change might be effected in the manufacture of the article itself as literally to stamp out the disease.

As I said, my purpose is not to dogmatise upon any theory, old or new, but simply to recognise the fact that the disease, so to speak, exists; and, without descending to any detailed particulars, give the result of some of my own experiences in battling with, and all but entirely overcoming, the evil.

Let me premise that blisters on albumenised paper are of three different kinds.—1. Those very small ones, the size of a pin's head, which go down in the blotting-book and are seen no more. These cause no trouble.—2. Those hard ones, often the size of a pea, which smother the surface of every print, and, when dry, leave a blue mark behind, thus rendering them utterly worthless.—3.

This kind is of rarer growth, but more potent character. Perhaps there will be but one blister in half-a-dozen prints, and sometimes there are two or three upon one, but these range from the size of a sixpence to that of a half-crown; and when, as is frequently the case with me, they burst out upon an otherwise faultless print on the full sheet of paper, they are especially annoying. These are particularly plentiful in hot weather and upon doubly-albumenised paper; in cold weather they very rarely put in an appearance.

Those mentioned as Nos. 1 and 2 never give me any trouble. If, in commencing a new supply of paper, upon a trial of a few prints as a pilot, I find it prone to go astray, I simply add a few drachms of liquor ammonia *fort.* to the hypo. fixing solution, and it is an effectual and perfect preventive. A bath of salt, after removing from the hypo., is often recommended, but I seldom if ever founded it of much avail. Liquor ammonia in the fixing bath is a sure and safe remedy, and easily applied; and, although for the time being it causes a considerable degree of transparency in the prints, it entirely disappears as they dry.

But for those large blisters mentioned as No. 3 ammonia is of very little, if any, avail. I have tried many expedients (possibly as yet not the right one), but only one has hitherto kept them in check, until the advent of cold weather put an entire stop to them. I found that about four ounces of a saturated solution of chloride of sodium *added to the hypo. bath* reduced them to a minimum, and nothing else seemed to have any effect upon them whatever (nor even this save *when added to the hypo. bath*), so far as I have hitherto made experiment.

I would add that I have noticed what appears to be a blister-producing power in some samples of hypo., whilst other brands were perfectly faultless in this respect, both being used upon one stock of paper. Both samples were perfectly neutral to test-paper, but some organic difference must have existed to induce such opposite results. The research into the blistering of albumenised paper from this new standpoint is worthy the attention of those who have time to pursue it, and possess the requisite knowledge of chemistry. In their hands for the present I must leave it.

◆

HOW TO CURE AND PREVENT DAMPNESS.

By H. N. King.

One of the greatest difficulties a photographer has to contend with is dampness; it means ruin to his negatives. Having had store-rooms in basements with this evil dampness, the question was how to care and prevent; for about five feet high the walls were in such a state that the paper would leave the walls without the slightest difficulty. The negatives (wet-plate ones) would insist on giving splendid map-like forms. The dry-plate ones were covered with mildew, and would all have been spoilt.

Visiting the "Healtheries," magnetic oxide or iron paint, for damp walls, &c., seemed to promise such wonderful results that I was induced to try it. I first of all matchlined for three feet high the walls, and after stripping the paper from the upper parts gave the whole two coats of the paint, and in the dampest portions three coats. It dries with a good gloss, and, forming a complete coating of magnetic oxide of iron, the damp cannot penetrate it. You may paint your floors and walk on it, and it will not show signs of abrasion. You can apply it to iron, wood, stone, or brickwork, and it will not flake or peel off. For painting plate-boxes, shelving, &c., it is excellent, and is ready for use and easily worked. The wall portion I afterwards papered with a light paper purposely, and there is not the slightest dampness in any way visible. I am very pleased with my work, and if any fellow-sufferer will do as I have done he will find how to cure and how to prevent dampness, and at a small cost.

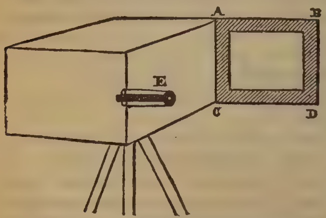
I do not know if I may be allowed to give a gratuitous advertisement for the paint in question. I have no interest in the matter beyond my success; but, if I may be permitted to say so, I purchased the paint from Messrs. Thompson and Co., 90, Merrow-street, Walworth, S.E., who were awarded a gold medal at the "Healtheries."

THE ABOLITION OF THE FOCUSSING-CLOTH.

By J. M. Carroll.

The focussing-cloth in outdoor photography has hitherto been regarded by most workers as a necessary evil. That it is an evil—being an unsightly, cumbersome thing—few will dispute; but that it is not a necessary one will be the writer's task to prove to the many readers of this welcome little volume devoted to our gentle handicraft.

For focussing, strictly so called—that is, regulating the distance between the lens and ground glass—it is certainly not required, for we nowadays put a mark on the tailboard of our cameras, which, used with judgment, answers all the purposes of getting the best possible definition for the stop used that the lens will give. The velvet is employed simply, I take it, for composing the picture; in other words, regulating the amount of subject, of foreground and sky, and laterally. Now, if we can accomplish all this without its aid, and that by looking at a true and not an inverted image, I think there will be a gain, insomuch the more as the artist can now at a glance study his subject and much more readily apply those rules and canons of art which, let us hope, he has given adequate attention to in his *student* days. The writer has not used one for a long time.



A very brief description with the aid of a diagram will suffice. A B C D is a light frame made of stout sheet brass—the opening being of the exact dimensions of the plate—hinged on to the rising front of the camera. When extended for use as seen here, it is kept *in situ* by a small button placed one inch external to the hinges, and when folded goes flat against the front and is held there by another button. There is only one more part—what I shall call the eyepiece, E, in the figure. It is simply a stout strip of the same metal pivoted to the side of the camera, and prevented from falling more than half-way by a small stop-pin. Its dimension is half the breadth of the plate, and has an aperture half-an-inch in diameter exactly opposite the centre of the frame in front. It folds straight up when not in use. To use the arrangement apply the eye close up to the eyepiece, and adjust the raising front and the camera upon its tripod screw. The view that you now see will be depicted with the greatest accuracy on your sensitive plate subject to a slight lateral displacement, which must be allowed for.

◆

A PLEA FOR MORE ART STUDY IN PHOTOGRAPHY.

By Edwin Cocking.

Musing in the exhibition gallery upon the pictorial records of the past twelve months, and free from the monthly (nay, weekly) recurring talk anent processes and their constituent items, chemical research, &c., we can turn, as it were, the train of thought on to another line, and revel amidst the transcripts of nature, animate and inanimate, which meet our gaze at every turn. Yet, despite all this attraction, there will arise the idea—"Might not these pictorial records have risen to a higher standard if as much thought and attention had been given to the purely pictorial in photography as had been given to the chemical and manipulative study? Why should the pictorial side of photography be considered to be attainable without the same attention being given to it that had been afforded to the scientific?"

All artists will tell you that nothing good can result from desultory thought and work. There must be the preparatory study; and, without alluding to the cultivation of the hand to convey artistic ideas, because the camera does not necessitate any work of this kind, there yet remains the cultivation of the eyes to perceive beauty, the brain to study composition, and both combined to watch for and appreciate the ever-changing aspects of light and shade.

Very slowly, it must be confessed, are the wonderful capabilities of gelatine plates being utilised for the production of figure subjects, where the objective (all *outside* the artist) can be made subservient to the subjective (all *within* the artist). Therefore, it is with feelings of satisfaction I add that the record of this year's exhibition will show artistic difficulties attempted and overcome.

But what a pity it is that this latent pictorial talent cannot be made to be the outcome of more cultivated and experienced observation! Why should there not be meetings exclusively devoted to the art side of photography? I have years ago often written upon this subject, and have endeavoured to show the absolute necessity for study and perseverance in order to accomplish good work by the agency of photography. But the time has, I think, long passed by for mere talk; it must now be practically shown what to do and how to do it.

There is without doubt a wide field opening for the production of works which satisfy the exigencies of art and cultivated taste; but, mark! I say *cultivated*, and this is the kernel of my observations. There must be frequent trials and possibly many failures, but assuredly success will attend those who desire to give a perceptive existence to pictorial conceptions. Why should not, then, the artistically-inclined photographer unite with other kindred spirits, and try what a consistent attention to, and a regularly-appointed time for, practical study of all that appertains to art can do for its advancement?

I think the time has come when, without depreciating one jot or tittle of the great importance and relative value of those beneficent mortals who give their scientific results to the brotherhood, there can be no reason why the same persistent enthusiasm devoted to the art capabilities of photography should not bring up to the same level any talent which for want of cultivation now lies dormant.

◆

ON IMPROVING LANDSCAPE NEGATIVES.

By George Smith (Dudley).

It was the late Archbishop Whately, I believe, who said "woman is an unreasoning creature who always pokes the fire from the top." If the cynical individual had been acquainted with photographers he might have described a photographer as a "conservative creature who always thinks a negative as good as it can be when it leaves the developing dish." I think I may venture to say that amateurs rarely attempt to improve their negatives after they are once made. For good or for bad it is their Alpha and Omega.

Although portrait negatives are considerably retouched, and, as a rule, are much improved thereby, yet there appears to be among photographers generally a prejudice against working upon a landscape negative except in the simplest manner—just touching out defects and so on. But why should not this working up be carried considerably farther so as to obtain the best result possible? A negative may be flat—physically weak, so to speak; why not "doctor" it and give it robustness and strength? Occasionally all "breadth" is destroyed by the lights being broken up too much; is it not allowable to reduce and tone down the lights so as to obviate this? Although to some persons there is a mysterious quality conveyed in the words "from an untouched negative," yet I think unless the negative were perfect it is allowable—in fact desirable—to do all that can be done to improve it. To my mind the end justifies the means.

In exhibitions and competitions perhaps it should be stated, as I believe it generally is, whether the negative is "touched," because in this case it would be difficult to say how much of the credit was due to the photographer and how much to the artist, and so unfair awards might be made. In other cases, however, let the negative be made as good as if the light, the lens, the plate, and the photographer had all combined to make it perfection.

With regard to the means of producing such effects: I fear my remarks may be considered more suggestive than practical. There are, of course, the different chemicals by which local intensification or reduction can be obtained. For intensification there is also the use of blacklead with the stump or washes of Indian ink; and for bright spots of light Chinese white or some other body-colour can be applied. An excellent plan where portions of the negative print too deeply is to paint over those parts on the back of the negative with collodion or varnish in which some non-actinic colour has been mixed. For reduction, ozone bleach can be used, or a more powerful agent is to be found in cyanide.

Mr. W. Brooks, in a communication to The British Journal of Photography for 1884, page 633, states that the deposit may be partially removed without injuring the film by strong spirits of wine and gentle friction. It is immaterial, however, what plan is adopted for effecting the object. Each individual may carry out the principles in the way he thinks best. I merely wish to urge upon photographers, and amateurs especially, that when a good negative is obtained, marred perhaps by some imperfection, they should endeavour to remove the imperfection and improve the negative in other respects. Much, I feel sure, may be done in this way by a little trouble and an average amount of artistic skill, always bearing in mind the old adage—"Whatever is worth doing is worth doing well."

"A thing of beauty is a joy for ever."

◆

DEVELOPING DISHES: THEIR VIRTUES AND THEIR VICES.

By C. Oakeshott.

Dishes are to be had of ebonite, of vulcanite, and of *papier-maché*. The advantage of these consists in their lightness—a consideration with tourists who develope as they travel.

Their great objection lies in the difficulty of keeping them chemically clean. The same applies also to porcelain dishes; these do well for a time, but the glaze is very apt to crack all over. The cracks absorb and retain with tenacity traces of the chemicals used, thus forming a fruitful source of marbling and scumlike stains, which are no improvement to an otherwise clean negative.

How is it that dishes made of glass—that cleanest and best of all materials—are not to be had; that is, in sizes suited to the various plates? Judging from the prices of the many moulded articles to be met with in the glass stores, they ought to be sold at a cheap rate. In days of yore, when the stereoscope was in vogue, glass dishes for that size with raised corners were common; but I fancy they are now things of the past.

I bought at a china shop, a few days ago, a glass dish, which in every respect excepting size (it will take only the half of a-quarter plate) is just the thing. It is light, has good depth, and can be easily kept chemically clean. Surely it would answer the purpose of dealers to supply glass dishes for the different sizes up to (say) the whole plate.

◆

PAPER NEGATIVES.

By "Assam."

I have been lately using Morgan and Kidd's ordinary enlarging paper for negatives, with very fair results. My method is as follows:—I have a Rouch's patent 10 × 8 camera with ordinary dark slide, in which I have fixed slips of copper, three-eighths of an inch wide, for the paper to rest on. I lay a sheet of sensitive paper face downwards, then a sheet of opaque orange paper, then another sensitive sheet, and so on alternately till I have ten to sixteen sheets of each kind. On the top I place a sheet of glass to keep them flat.

The exposure is long, being about the same as for a wet plate. In Kashmir my usual exposure with $\frac{f}{12}$ was, on a fine day, for buildings two to five seconds and for open landscapes four to ten seconds.

After exposing I place the dark slide in a changing-bag 28 × 12 × 5 inches, made of three thicknesses of twill, having sleeves in the five-inch sides near one end and a slit at the other which rolls over; when covered by the focussing-cloth it is perfectly light-tight. I remove the exposed sheet and the opaque paper next it and place them at the back of the glass, which operation takes less than a minute and can be done anywhere.

I develope at night, using orange paper and cherry cloth round a lamp. The paper is immersed in water for about a minute, and for a 10 × 8 plate mix the developer—

Pyrogallic acid	4 grains.
Bromide of ammonium	2½ ,,
Ammonia	6 drops.
Water	2 ounces.

Turn the paper face upwards and pour off the water, when the paper will be quite flat. Pour on the developer and the details should be out in one minute at the most; but care should be taken not to push the development too far, as the shadows should be quite white. Wash, and then fix for ten minutes in hypo. one to five; wash, soak for ten minutes in saturated solution of alum, and wash again. If the negative be stained yellow use saturated solution of alum ten ounces, citric acid half-an-ounce, after which wash.

There are three ordinary ways of making the paper transparent:—First, with white wax, as in the old paper process. Second, castor oil four parts, ether one part, brushed on the back; then warm, and when cool with a rag brush off the superfluous oil and warm again. Third, brush over the back of the negative a mixture of Thomas's india-rubber solution two parts, pure benzole one part, Canada balsam three parts.

I have, owing to want of time, only been able to get some rough proofs of my negatives, but several amateurs who have seen them are much pleased with the process. I found 10 × 8 plates weighed eight to ten pounds, including packing, whereas nine dozen paper negatives weigh less than four pounds, which makes a great difference. Then, with one wet-plate slide and a changing-bag weighing a few ounces, I can take twelve to sixteen negatives, the whole set in the field weighing twelve to fifteen pounds.

SUGGESTIONS FOR THE IMPROVED MOUNTING OF LANTERN TRANSPARENCIES.

By Dr. D. G. Thomson (Surrey County Asylum).

It has often occurred to me in examining lantern slides—transparencies mounted on glass—and in reading about their manufacture, that the makers of such slides might learn much from a consideration of the way in which microscopic slides are prepared.

It may be asked—"What can an amateur have to say, who, perhaps, has not prepared a gross of slides in his life, on a subject so purely mechanical and technical that could be of any value to the many well-known and eminent makers of lantern transparencies?" I do not presume to teach, however, but merely to suggest what the preparation of hundreds of microscopic slides has done in the way of helping me to make lantern slides cheaper, less cumbrous, and better in every way than those to be found in the market.

Slides showing microscopic sections of the organs of the body used in medical study are, generally speaking, small editions of an ordinary lantern slide, namely, a transparent object mounted between two glass plates. There is, however, in the mounting of these two slides this important difference—that whereas the lantern slide maker protects his object or picture by placing on it a plate of glass of equal size and thickness to the plate on which is his picture, the microscopic slide-maker simply covers and protects his object with a thin glass disc, called the "cover-glass."

Now, my chief suggestion is—Why should lantern slide makers not adopt this plan of simply covering and protecting the transparent film by a round glass disc, instead of the clumsy method in present use of protecting the film by placing over it a large, thick glass plate, similar in size and thickness to the one on which the film is? The weight of a gross of slides would be reduced nearly to one-half—no small matter to travelling exhibitors. The horrors of mounting the lantern slide with paper, and also of keeping the paper in repair, would be in a great measure diminished, and no dust or air could possibly enter and deteriorate the film.

Several writers in former ALMANACS have deplored the imperfection and clumsiness of our present methods of mounting, and have asked for suggestions as to improved methods. At a recent meeting of the London and Provincial Photographic Association thin metallic binding mats were suggested, similar to those used by itinerant glass positive portrait takers. These, in my opinion, are altogether unsuitable. They are neither dust- nor air-tight, and any practical man can easily picture to himself many little difficulties in working with such flimsy metallic strips.

What I would suggest, then, is as follows:—Let us suppose we have the finished transparency on glass ready for mounting. The first thing to be done is to obtain thin, round glass discs, the same diameter as the usual lantern slide transparency, from any scientific glass dealer or optician. It is advisable to have them much thicker than those used for large microscopic slides. Take one of these "cover-glasses," as I shall call them, and lay it on the film side of the transparency. Now buy or make the following simple piece of apparatus, familiar to microscopists as a turntable. This is simply a brass disc four inches in diameter, rotating horizontally on the end of a wooden board eight or ten inches long by four inches broad. Now lay the transparency with the cover glass on the brass disc; with the left hand rotate the brass disc, and having in the right hand, which rests on the board, a camel's-hair brush charged with black (asphaltum) cement or white (zinc) cement, seal the cover glass to the transparency. The ease and certainty with which this can be done need to be seen to be appreciated; and, difficult or lengthy as the description of the process may lead one to suppose it to be, it is much more rapid and simple than the sticky, messy gum paper mounting.

No mats would be necessary, as the cement is opaque, and once the cementing ring had dried it would only be necessary to paint the exposed corners of the transparency over with the cement; or, possibly, it might be better just to gum on a flat mask, and so stop out the parts of the transparency not to be used on the screen image. It may be asked—"Why not fasten the cover-glass to the slide by this gummed mask?" I believe, however, that this would not be so strong, nor would it so effectually seal up the picture from air and dust as the cement laid on in the way I have described on the turntable.

In conclusion: I may add that it would be a still further improvement if, as is done in preparing microscopic slides, instead of having a layer of air between the transparency and the cover glass, some substance of a refracting index nearer to that of glass than air is (such as dammar varnish) were poured over the transparency, then the cover glass applied and cemented as above described.

◆

PHOTOGRAPHY ON THE WHEEL.

By Kenneth W. M. Bean.

Most articles on the above subject are written from a tricyclist's point of view, and as the three-wheeler has plenty of stowage room and a steady base to run on, this mode of carriage is deservedly popular; but as many photographic "wheelmen" prefer the bicycle for its convenience in housing, ease of driving, and greater speed, a hint or two how to adapt it to carrying a small photographic kit may not be out of place in "ours."

The tripod would be the most awkward article in the kit, and even when each leg is threefold it is often longer than the handle-bar of the bicycle; and, as the bar is the only place to stow it out of the way, the rider must fain place it there, and a couple of good straps round the folded stand and the handle-bar will keep it firmly in its place.

Then, as to the camera and slides: a knapsack carried on the shoulders is frequently used, but in case of a "cropper" over the handles the result to the rider and the contents of his knapsack would be decidedly unsatisfactory. The only other position to place the bag will be on a frame carried on the backbone of the machine. The frame I use is made of stout iron rod bent in an oblong shape, held under the saddle by the saddle screws, and is slightly curved to the line of the backbone. Two strong straps are stitched on to the sides of this frame, and when a small oblong bag made of mail canvas—just large enough to hold a half-plate camera, three double slides, and six extra dry plates—is hung on the iron loops under the saddle and resting on this frame, the straps are passed over and round the bag and braced up taut.

The lens can be carried in the rider's pocket. I pack mine inside the camera itself, well wedged up with crumpled newspaper to keep the ground-glass screen from being broken. The iron frames can be purchased for 2s. 6d. at any bicycle shop, and are usually supplied with the *multum-in-parvo* bags.

On rough roads the vibration will be considerable, and riders should see that their frame and valise are firmly secured, as a bad fall would result from the bag getting loose and swinging into the wheel.

VIGNETTE.

By Thomas Bedding.

Ah! if it were not for the face
  That haunts me from Bow to Belgravia,
I might your existence efface
  And banish myself to Moravia.
Or, better, migrate to a flat,
  Somewhere t'other side of the Channel,
—Lutetia for choice—but for that
  Divine Mendelssohnian panel.

Displayed in the shops of Natal;
  By rivals beloved as Satan;
Accorded "the line" in Pall Mall,
  As if painted by Millais or Leighton!
By Dives approvingly scanned,
  You sparkle in sweet Piccadilly;
And critical tongues in the Strand
  Compare you with Lotty and Tilly.

What nobler triumph for the bride
  Of an octogenarian duke:
To be coldly, or lustfully eyed
  By the world, without fear of rebuke?
A gaily-caprisoned coach,
  Twelve thousand a year and a title,
Can silence the softest reproach—
  Or change into sweets the most vital!

The frowziest, paltriest knave
  That breathes, either native or foreign,
Can ogle your charms from the pave
  And call you his own for a florin!
The vestals of sacred burlesque—
  So lavish of limb and of powder—
Admit "She's at least picturesque,
  But *might* dress a little bit louder!"

Well, well! perhaps the grapes *have* gone sour—
  Yet 'tis hard in the youst to be beaten
By one, who in earlier hour,
  Begot me a "fag" boy for Eton!
'Tis soothing to blame, though the sting
  Outrival the virulent hornet;
And better the caressed of a king
  Than wife to a prodigal cornet.

Ah! if that dispassionate face
  Could vanish but into Alsatia,
I might philosophically trace
  Your name in the sands out in Asia.
Or smoke me a pipe on a flat,
  In solitude over the Channel;
Unknown to St. James's and that
  Divine Mendelssohnian panel.

SUBMARINE PHOTOGRAPHY, &c.

By John Ingham.

I tried during the past summer to secure a few photographs of the sea bottom off the west coast, but my success was not great. I give you my experience. The lens was a Fallowfield doublet. The camera was at first enclosed in a tin case, but afterwards in an iron stove made watertight and glazed with thick plate-glass. The thicker the glass the better, as the pressure at a very little depth was enormous.

I soon found that to get sharp pictures I must give rapid exposures, and the light at forty fathoms was very weak, so I had to confine myself to shallow waters.

The method of procedure was as follows :—The camera and lens in their iron case were fastened on a frame having four legs. The shutter being set, and the usual wire attached for electric releasing, the lid was then hermetically sealed, and the whole was lowered about two yards ; then a large net cork was attached to the line (to help to keep the camera erect). It was then lowered to the bottom and the exposure given, which at thirty-one fathoms was half-a-second ; but it was under-exposed, though, owing to the movement of the weeds, I dare not give longer. Next summer I shall try with the aid of artificial light.

I think photographs of wrecks would be a great help in Board of Trade inquiries, and perhaps also in searching for wrecks, as the services of a diver would not then be required.

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A DIFFICULT LANDSCAPE.

By Major Geo. Verney.

In North Wales one of the finest sights is to see a slate quarry in full work, with the hill side cut into galleries tier upon tier, extending from deep excavations in the valley to the top of a high mountain. Hundreds of workmen may be observed extracting the slates, filling the diminutive waggons with them, and dispatching them to a central station, where they are sorted previous to being sent to their destinations. Take, for instance, the largest of these quarries—those belonging to Lord Penhryn, near Bangor.

A lovely drive from the latter place for about eight miles brings you to the quarryman's town, called Bethesda, to which place the London and North Western Railway Company have just opened a line from Bangor. Another mile or so brings you to the quarries. Standing on the brink of a sheer precipice the view is truly imposing. At your feet is a vast abyss from which slates have been extracted, and in front a huge mountain of slate from which the slates are being quarried. Rising from the bottom of the abyss to the top of the mountain are open galleries (some fifteen feet) one above the other, in which scores of men, looking scarcely larger than flies, are quarrying out the slates and transmitting them to their destination. In front of you stands a tall, needle-like shaft of rock, which rising as it does in the middle of the quarry, and being devoid of slate, has been left standing by itself, and by extracting the slate all around it has been left in the middle of the quarry to frown on the destruction going on around it. This huge needle rock is pierced by four or five tunnels some thirty or forty feet one below the other, showing distinctly the progress of the works going on deeper and deeper into the bowels of the mountain side of slate. The highest tunnel of all must have been superseded many years ago by the one forty feet below it, and this one again neglected for the next one, and so on till we reach the lowest tunnel now in use; and in this way the quarrymen descend, leaving these tunnels in the needle rock to show where they have been working in years gone by. It has a striking effect seeing these tunnels one under the other, high up in the needle rock with no visible path leading up to them, and through which the daylight on the other side is plainly visible.

Now, try and photograph this remarkable scene. In the first place, the mountain side looks due north with mountains of slate on the east and west, so that the sun rarely if ever illuminates the whole of this vast semicircle of slate. There are very few points where a thoroughly comprehensive view can be obtained, and these all have the light just in front of the camera. But the real difficulty is the want of light and shade; or, perhaps, I should be more correct in saying, the absence of light and the presence of an undue proportion of shade. To this is added the peculiar uniform colouring of the landscape—all of a dull slate colour, without a bit of green, or a solitary tree, or any of the ordinary features of a landscape to relieve it. Slate, nothing but slate—slate rocks, slate huts, slate waggons, slate ballast on the lines of rails, and even slate-coloured faces and clothes.

I have never met with a more discouraging subject from a photographic point of view, and hardly ever one of greater interest and one more deserving of being well represented. I exposed two 12 × 10 plates which have succeeded as well as I could expect. A print from one of them I sent to the Exhibition, but I fancy most visitors would only award it the praise of being a slatey smudge. I was unable to procure any good photograph of the quarries, so I suppose they have bothered the local artists as much as they did the writer of this sketch.

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NOTES WITH REFERENCE TO THE USE OF ARGENTIC BROMIDE PAPER.

By J. Pike.

Now and then, when working with this paper, stains occur owing to some want of care in manipulation. The makers very properly urge the necessity for perfect cleanliness of fingers, dishes, &c., and the formula they give for a *clearing* solution answers very well its purpose.

One stain, however—that of a very disagreeable colour, and with metallic lustre—I have up to a recent date always considered fatal; but I find that it may be got rid of by using a solution of hydrochloric acid one part and water thirty parts. While the print is still wet remove it to a piece of glass, and with the fingers or a piece of cotton wool apply this acid solution, rubbing well in, when the stain gradually disappears. It is remarkable what an amount of rubbing the film will stand even with a stronger solution than this.

When the stain has entirely gone, wash; then immerse in fixing bath again, wash well, and finish in the usual way.

CLEARING THE EDGES OF WET-PLATE TRANSPARENCIES.

By John Harmer.

It is often necessary to produce transparencies with a clear margin of definite size and shape. If the transparency is to be of the same size as the original when enlarged, there is no need to be exact as to shape and dimensions, masking the original answering every purpose; but when the transparency is required to be enlarged with a spotless margin to suit fancy glasses already provided, then some speedy and effective method of making it so is desirable. To manage this to ensure a clear sharp edge is not very easy unless the superfluous film is made to strip or float off easily.

This quality is best produced in this manner:—Make the transparency in the right position on the plate and allow it to dry; then place it upon the transparent shape it is to fill, and prick a hole in it at each angle or over the four corners of the shape in question. Afterwards, with a sharp, slightly-rounding edged knife and straight-edge, make a clean cut in the film between the points. Now with a soft brush and gum-water moisten the portions of the film it is desired to remove, taking no particular care to prevent the spreading of the solution. Again let dry, and then place the whole under the tap for a few seconds, when it will be found that the gummed parts will soon rise and go off speedily into the sink. Wipe the back of the transparency, dry, and varnish it.

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HINTS.

By Joseph H. Woodworth.

Trays for Enlargements.

In making enlargements the matter of trays becomes a question. I have found an excellent way is to get two tins made the size required, with rings at each end for lifting. Glue brown paper over the angles and joints inside, and give three coatings of Brunswick black. Let each dry before applying the next. Give also a couple of coats to the outside of the tin. Tie a piece of string to the handle of the hypo. bath, or otherwise mark it so as to keep it exclusively for that chemical, and—"there you are!" You will have efficient, unbreakable, and inexpensive trays. Those I got made for half-sheets of paper—say 18 × 12—cost two shillings each for the tins. I use for whole-sheets, and up to (say) 30 × 22, wooden dishes, which I have lined with zinc and varnished as above; but they are rather clumsy, and if I were to repeat them I would prefer the tin for that size also.

Developing Formula.

In using plates by various makers is it necessary to adhere strictly to the "prescription" accompanying the plates? Bearing in mind that, generally speaking, the chemicals are the same, differing only in their proportions, it is quite obvious that there need be no necessity for such a number of "mixtures." In practice I have for a long time used the one set of solutions for every make of plate, adopting a modification of a formula given with the "films," of which, by the way, we have not heard very much lately. The solutions I use are as follow:—

No. 1.

Pyro.	2 drachms.
Glycerine	1 drachm.
Methylated alcohol	6 drachms.

No. 2.

Ammonia	2 drachms.
Glycerine	1 drachm.
Water	6 drachms.

No. 3.

Bromide of potassium	30 grains.
Glycerine	1 drachm.
Water	7 drachms.

I have two small beakers kept for their special solutions. Into one I put ten to twenty drops of No. 1, filling up with water; in this I soak the negative. Into the second beaker I put (say) three or four drops of No. 2, and an equal quantity of No. 3, filling with water and adding to the solution on the plate—usually not all at once—till I see the effect, and then varying according as the plate "comes out." A second plate can be developed in the same solution, the action being slower; but, in cases of various exposures or a different class of subjects, it is safer to make a mixture for each plate, and I have sometimes found it useful, when a negative is developed to a given point, to pour off the solution and redevelope with fresh mixture.

THE QUARTER-PLATE CAMERA.

If I were asked by a beginner—"What camera would you advise me to invest in? Shall I get a quarter-, half-, or whole-plate one?" I should have little hesitation in saying—"get a quarter-plate camera." It has one disadvantage, but it has several advantages.

Of course its disadvantage is the small size of the picture produced; but even quarter-plate pictures, with judiciously-selected subjects properly lighted and artistically composed, are well worth looking at, and will show to good effect in a tastefully-arranged album, while mounted as *cartes* such bits of scenery will be found very acceptable to artistically-minded friends. If any of the negatives should be exceptionally good and sharp, it is quite easy to enlarge them to almost any size desired. I have enlarged a good group from a quarter-plate to a whole-sheet of Morgan and Kidd's paper—say to 21 × 17—and have amplified a bit of a 5 × 4 negative (about $2\frac{1}{4} \times 1\frac{1}{2}$) up to about $16 \times 10\frac{1}{2}$ with very satisfactory results. Bearing this capability in mind, the small size of the original negative ceases to be any serious disadvantage.

The first advantage on the side of the quarter-plate camera is connected with its cost. Not only is the camera relatively cheap, but extra double dark slides and plates to match are also in proportion. During these hard times such a consideration is not to be lost sight of. I may here say, in passing, that I fancy many persons are deterred from taking up photography by thinking it a most expensive amusement —an idea justified by a glance at the prices frequently quoted for cameras and lenses. I am heretic enough to consider that lenses especially are greatly overrated when bearing well-known names. The lens I use is an "instantaneous" one, provided with an ingenious shutter which can be removed and replaced by a funnel stop. I have slightly reduced the aperture with a piece of perforated zinc, and will back the definition and working of the lens (which, with the shutter, cost me one guinea) against almost any I have seen for practical work. For obvious reasons I do not name the maker.

A second advantage in the quarter-plate negative is its suitability for making lantern transparencies by contact printing—probably the most pleasing and useful mode of exhibiting photographs, whether we regard the convenience of showing them to a large number at the same time or the bringing out of details, frequently lost sight of in a paper print.

The chief advantage, however, in the use of the quarter-plate camera is its great portability. Where the day's work has to be done "on foot" this is a most important point, as all practical outdoor workers know. With the camera slung in a satchel on the back, half-a-dozen double dark slides in various pockets, and a light folding-stand in the hand, the happy amateur can, if he choose, light his cigar and stroll leisurely along, contemplating philosophically his fellow-traveller, the proud possessor of a 12 × 10 and plates to match, toiling wearily under a sultry sun to secure three or four negatives against his dozen, any or all of which he can, if worth while, enlarge quietly at home to any reasonable size that may please his fancy.

If I am not mistaken the quarter-plate camera will probably be *the* camera of the future, unless, indeed, *smaller* sizes—literally "pocket" cameras—should outstrip them in public estimation.

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LANDSCAPE PHOTOGRAPHY: MY KIT AND ROUTINE OF WORK.

By John Jackson.

In response to the Editor's invitation to contribute an article to the Almanac I have with some difficulty been able to choose a subject. Gelatine in all its phases will, no doubt, have numerous exponents, and my aim, in writing this article, is to steer clear of what will be most amply and ably treated by more competent writers, and with this end in view have chosen the above as the title of my paper.

For the work in which I have been engaged I employ two sizes of plates, namely, 12 × 8 and 8½ × 6½; and for the larger size I use nothing but patent plate, getting these specially coated by one of the commercial makers of dry plates. My camera is one of Rouch's patent, twelve inches square, has a vertical as well as horizontal swing, and the bellows expands to twenty-seven inches. I have twelve double slides, and on the outside of each of these are sunk in ivory labels about two and a-half inches long, on which are the numbers of the slides from one to twenty-four. Twelve of the compartments are fitted with light carriers for the 8½ × 6½ plates, so as to avoid having to carry two cameras.

The camera and slides are arranged in three cases with locks and keys, thus:—Two slides and the camera and focussing-cloth (sixty inches square of black makintosh) go into one case. Another case contains four slides, and at one end of this is a compartment which carries all my lenses, drop shutter, adapters, &c. A third case contains the remaining six slides. Before starting my day's work these are so arranged that I have half of each size of plates in each of the cases, and the kind of plate is marked in pencil on the ivory labels. Two of the cases are carried by an assistant over his shoulder, being connected by a wide strap; the other is left at some convenient place until required. As soon as an exposure is made I mark on the ivory label the word "exposed," and at the same time jot down in my field book the number of the slide, lens, stop, exposure, time of day, light, and any other remarks that I may think necessary. A specimen leaf of this field book will be found on page 174 of THE BRITISH JOURNAL PHOTOGRAPHIC ALMANAC for 1880.

My lenses consist of a set of Ross's portable symmetricals from six inches focus up to fifteen inches. Of these I have four, namely, six, seven, nine, and fifteen inches; and by a system of interchanging the combinations of them, and also using the back or front combinations alone, I can get almost any focal length required from six to thirty inches. I have also two rapid symmetricals for instantaneous exposures, groups, &c. These have each a slot cut in the mount close to the diaphragms, into which a simple drop shutter fits, the slot being covered by a brass ring when the drop shutter is not in use. This shutter is made of metal, and by a simple arrangement I can use it on any of the portable symmetricals if necessary.

The stand which I use for outdoor work is a tripod five feet in height, with a metal triangle top ten inches across. This is covered with leather, which not only saves the bottom of the camera from being scratched, but also renders it more rigid. When the stand is not in use the top slips into a leather strap on the outside of the camera case. For interior work I have another stand which has sliding legs that can be raised to eight feet if necessary. The top of this has a turntable and swing so that the camera can be levelled, raised, or depressed without moving the legs after they have been placed in position. For its special use I find this a most useful, although bulky, stand. Mine was made by Mr. H. Husbands, of Bristol, and I understand he now makes the same kind of stand a great deal lighter.

For placing under the legs of the camera stand to prevent slipping on glazed tiles or polished floors, which are very frequently to be found in interiors, nothing is better than three small pieces of vulcanised india-rubber, each about two inches square. I have used such for some time and find them far superior to leather, which it is always necessary to have wet to be of any use. In my pocket I always carry a small spirit level and compass. The lamp which I use for changing plates is the same as that described by me in last year's ALMANAC. It is exceedingly simple and compact, and gives a safe light and plenty of it. As a rule I do not develope any negatives away from home.

My first work after arriving at the field of operations is, if a stranger to the place, to make a general survey of the neighbourhood, noting down the subjects of interest, finest points, and also the approximate time of day when best to be done. A compass is very useful in this work. When this is completed and copious notes made I can then arrange the various subjects into their different times of day, and thus avoid the trouble of going to a certain subject to find, when I have got there, that I am an hour too soon or two hours too late to have the best light for it.

When the exposures for the day are finished I change the exposed plates, no matter whether these may be only one or two or the whole twenty-four. This I do after dark in my bedroom, in the following manner:—First, I arrange the slides to be changed according to their numbers on my left hand, lifting the first towards my right; and, opening it, I take out the two plates and mark the number of slide and page of field book in the corner with a soft pencil. I then place them face to face with a piece of tissue paper between the two films. These two plates I lay on a sheet of orange paper. Now take the next slide, and, having opened it and placed it on the top of the first, proceed as before, and so on until all the slides are emptied. I then wrap up the exposed plates and pack them away in their original boxes, being careful to mark on the box the word "exposed" with the reference number—the page in field book. This being done I next proceed to refil the slides for the next day's work. When all the slides are to empty and refil, this work occupies fully one hour. So ends my day's labour.

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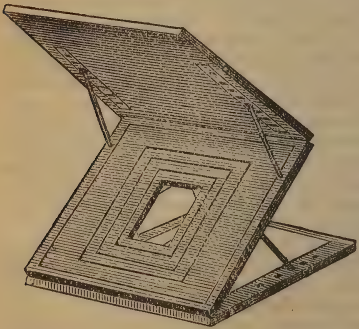
RETOUCHING FOR BEGINNERS.

By David M. Linley.

A few lines on the above will, perhaps, be of use to those who are not already proficient in the art of retouching. It is, like painting, very difficult to teach this branch of the photographer's art without personal superintendence; but a little instruction in these pages may put some in the right way.

A desk to accommodate the negative is the first requirement. This may be made by taking three quarter-inch boards twelve inches square, and hinge them together similar to the diagram. In the middle one cut a hole, so that your quarter-plate carrier from the camera will just drop through. Nail or glue some thin bits of wood at the four corners of the opening, and then, of course, it will hold the carrier from falling through. The top board is simply for keeping off all top and extraneous light, which is most important. To keep the whole desk rigid, two uprights must be used at each side of the desk—say, slips of quarter-inch wood four or five inches long. The sketch will answer the purpose of model for these details. On the bottom of the flat board nail a piece of white cardboard, so that the negative's defects may be better seen when looking through. As it now stands facing, and close to, a window, all is ready for work, but if it is to be used at night a lamp will be necessary. Place this, of course, at the back of the desk immediately opposite the opening for the negative. Between the lamp and the negative place a sheet of ground glass, or, failing that, a piece of plain



glass covered with ground glass varnish or gummed tissue paper. This subdues the brilliancy of the lamp, and somewhat diffuses the rays of light, giving more equal illumination.

Now to work. Take a quarter-plate negative—head and bust, say—of medium density. To make the pencil (H B or H H) bite well on the film is the first consideration. Obtain a pennyworth of lump resin and rub the middle finger round and round the flat surface of the resin until a small quantity of the powdered resin adheres to the tip of the finger. Apply this to the face of the subject and rub with a roundabout motion, not heavily nor yet too gingerly. This will abrade the film, which is as yet unvarnished. Dust off all surplus resin with a flat camel's-hair brush, tuft of wool, or bit of soft wash-leather. Make a long sharp point on your pencil and apply the pencil as follows:—Commence on the left side of the negative and work towards the right, doing the forehead first, then the nose and heavy lines running from the nose to the corner of the mouth, then from the left cheek bone down that side of the face; the same with the right side of the face, and, lastly, the chin and under parts of the chin and face. Keep to these rules in working always from left to right. Fill up the freckles and rough defects first. Do not fill up a freckle by working the pencil with a round and round motion describing small circles within the freckle. Make a bold line through it heavy in the middle of the speck, letting the pencil touch lightly in starting the line, then heavy in the freckle, and lightly again as it leaves the defect. The action is really comet-like—a dot with a tail to it. Small light crosses are sometimes made in obliterating these flaws, the same principle being observed, touching lightly except in the very centre of the freckle.

Clean the face all over after this fashion, and then the work of softening and blending may be commenced. Short light lines, or dots with tails to them (commas), or a combination of both, are worked well in the direction of the principal lines of the face; that is to say, the lines, in the forehead running at right angles to the nose would indicate that, in retouching the forehead, the pencil should work with a lateral movement, and not up and down with an upright motion. The same principle applies in working down the nose and in and along the heavy lines of the face and mouth, softening only and not obliterating these lines which always give character and expression to the subject. Touch lightly, and do not pile on the lead, especially on the high lights, as it will have no printing value.

Study the half-tones and shadows, and be careful not to put too much work on; rather err on the side of too little, or the likeness will suffer. Look at the face as a whole, seeing that there is nothing abrupt—no high lights against violent shadows; blend them together a little, making the face look soft and round. Sometimes a slight pencil touch to the lips and a strengthening of the whites of the eyes (the "light" speck included) give vigour and force to the expression. The same may be done with the points of a frill or collarette, and often with advantage on parts of a collar. With a little practice opals, carbon enlargements, and the like, can be easily worked up in black and white chalks, Indian ink, or sepia; the work being applied on the same principles as in retouching, bearing in mind, however, that one is a negative and the other a positive.

The hands may be also looked at, in three-quarter and full figures, for defects, and pencilled up where required. For pinholes in the film, fill up with Indian ink and gum water very thin, using a fine camel's-hair pencil brush; after this varnish, and the negative is ready for the printer.

LOCH AWE.

By Charles Stephens.

My annual trip with the camera having been taken very late this year, I am only in time to send a contribution to the "where to go" series for the Almanac, in hopes of inducing some of my amateur brethren to try their hands next year in the "happy hunting ground" where I spent a fortnight most agreeably in September last.

The said happy hunting ground may be approached by divers routes, viz:—1. By rail from Edinburgh or Glasgow *viâ* Stirling and Callander. 2. By steamer from Greenock through the Kyles of Bute to Ardrishaig; thence by coach to Ford at the south end of the loch, in connection with steamer to the head of the loch—a run of nearly thirty miles. 3. By rail from Oban about twenty miles, occupying an hour. It matters little which route is taken, for by all three the scenery is lovely.

Arriving by steamer or rail we find ourselves at a picturesque station and landing stage combined, at the foot of a rock, on which stands the Loch Awe Hotel, of good external appearance and with internal comforts not to be surpassed, for everything that can be done for the welfare of his visitors is most pleasantly done by Mr. Duncan Fraser, the proprietor. Quarters should be secured some time in advance, for the hotel is full to overflowing throughout the season. Subjects for the camera, within easy reach of head-quarters, are sufficiently numerous for many days' work. There is a terrace in front of the hotel, from either end of which good general views can be got when the clouds hang over Ben Lui to the west, or the lower hills to the east.

From the west end of the station platform a good "bit" can be got, including the shore on the left, close along which the railway runs, and Kilchurn Castle somewhat distant to the right. I was lucky to get sufficiently good light to take an instantaneous picture of a train curling round between the rock and the lake. Turning the camera right about, a pretty view of the hotel, with the rock on which it stands, and part of the grounds is well worth a plate.

Kilchurn Castle—a fine ruin on the edge of the loch—makes a good subject from two points on the Dalmally road, about 400 and 600 yards respectively from the hotel, or from an island which can be reached in a row boat in five or ten minutes.

A pleasant morning's work may be done with a light camera by taking the steamer at 9-30 a.m. to the Falls of Cruachan, about two and a-half miles, and walking back by the road which skirts the lake and presents several "bits" worth taking, including a pretty little church which lies between the road and loch. Further along the same road, about seven miles from the hotel, is the Bridge of Awe which makes a good picture from both above and below. This can also be reached by taking train to Taynuilt, the first station towards Oban, and coming back a mile along the road.

Two days may be well devoted to a trip down the loch—one to Port Sonachan, where some good subjects may be found about the landing pier and hotel grounds, and from a bit of broken ground at the back of the hotel. Nearly four hours can be spent here before the steamer returns, giving ample time to find and capture several "bits," not forgetting an excellent luncheon which may be procured in the hotel. By taking the steamer another day to Port-in-Sherraick—sometimes profanely called "Port and Sherry"—a few plates may be profitably exposed on the picturesque ruin of Ardchonnel Castle, which stands on an island near the shore. Two hours can be spent here before the return of the steamer from Ford, taking the precaution of having luncheon on board before landing.

The voyage home is rapid and pleasant, with the wooded shores on either side, and the lofty Ben Cruachan towering in front of us.

Numerous other excursions may be made by road or rail from the Loch Awe Hotel; but I hope that I have said enough to induce some of my brother amateurs to try their luck in this most charming of spots.

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PACKING PLATES FOR TRAVELLING.

By Seymour Conway.

The changing and packing of sensitive plates while on a tour is such a great nuisance that any "wrinkle" which will facilitate the operation will be hailed with delight. The simplest plan is to put paper between every pair of plates; but complaints are often made that the paper causes markings on the plates. This would, no doubt, be the case if the paper were not pure or contained traces of hypo.

There is a blotting-paper made and sold by Messrs. Morgan and Co., of Cannon-street, which I can strongly recommend for this purpose, as I have not found any deleterious effect produced in plates that have been in contact with it for several months.

I think it is as well to carry a broad camel's-hair brush with you, and always dust over the plates before placing in the slides or automatic plate-boxes. I always wrap my plates up in packets of one dozen, and pack them in the usual boxes sent out by plate-makers. When on a tour this is, in my opinion, far preferable to plate-boxes.

I sent my plates when in Switzerland last year—several times—by "poste," &c., and did not have a single fracture. This would hardly have been possible had they been grooved boxes.

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WRINKLES.

By J. C. Stenning.

Cutting Glass.—It is strange how few people are aware that glass can be cut with a pair of scissors; yet such is the fact. I do not mean to say that it can be cut into such shapes or into such sizes as are produced when using a diamond, but under certain circumstances a pair of scissors—sharpness is of no consequence—will effect more than a diamond can. It is required to cut a piece of glass, not too thick, into an oval, circular, or irregular shape (say) for a frame, locket, &c. Take the piece, hold it an inch or two horizontally under the surface in a basin or pail of water, and then chip off small pieces at a time with the scissors, using them in the usual way. Practice will soon teach how much to cut off at a time. Beginners will, no doubt, be too ambitious, and if they attempt to cut the glass right across, or too much at a time, they will fail as certainly as if they attempt to chip bits off without using water. The reason why the glass when cut under water does not fly or crack is that the water prevents the vibration.

Cleaning Out Emulsion Flasks.—To get these clean was for a short time a trouble, but a few seconds is all that is now required. A piece of flannel, say two inches or so wide and a foot long, is put into the flask, being tied in the middle by a long string, which is left hanging outside. Fill half full with hot water, and give the flask a rapid, circular motion. The flannel weighted with the water rubs closely on the inside of the flask and removes all emulsion. When the flask is clean draw the flannel out by the string left outside. This is a better way than cleaning with salt, for the fewer chemicals about the better.

Dropping Tube.—Take a tube an eighth of an inch or so in diameter and eight or ten inches long, having it drawn to a fine point at one end, and on the other an india-rubber teat in which the hole is closed up, or one that has been used for filling ink pens. Squeeze the teat when the tube is in the ammonia and bromide solution. A certain quantity will be taken up in the tube, and a slight pressure will eject the liquid in drops. This is a much quicker and more certain plan than dropping from a bottle. The idea is not my own, but I think I got it from some publication—perhaps a former number of this ALMANAC.

Packing Plates for Travelling, &c.—The best plan I have used is to have small frames of thin cardboard (say) one-eighth to three-sixteenths of an inch wide, which are placed between the sensitive surfaces of each pair of plates. They are easily made by cutting the cardboard to the lengths and widths of the plates and gluing the corners together. Perhaps some enterprising dealer in photographic materials might introduce them ready cut out for different sizes.

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A PLATINUM SPATULA.

By R. TINDALL.

MAY I recommend those of my brother photographers who do not possess such a thing to get one at once. Too expensive? Well, 7s. 6d. or thereabouts; and what a handy little tool it is. Do you want to measure out pyrogallic acid in the dry state? The spatula will do it. Do you want to mix solutions by stirring? The spatula will do it. Do you want to fuse salts over a burner? The spatula is ready, except for lead or silver salts, nitrates, hydrates, or cyanides. Do you want to peel fruit? The spatula makes an excellent fruit knife.

Finally: if you want to cut THE BRITISH JOURNAL OF PHOTOGRAPHY (or any other book) the spatula is the very thing. I have had one for more than ten years, always keep it in my waistcoat pocket, and use it many times every day. Were I to lose it I should at once get another, for I could not be long without one.

A REMEDY FOR OVER-EXPOSURE.

By the Rev. A. Johnson, M.A.

The great difficulty of remedying the over-exposure of a gelatino-bromide plate, even when known before hand, is universally acknowledged.

With me, treating the over-exposed plate with excess of bromide in the pyro. before adding the ammonia has not had the desired effect. Development is simply retarded until sufficient ammonia is added to turn the scale, and then it starts and proceeds as if unrestrained.

I have used with great satisfaction Dr. Eder's developer, "with which the negative may be saved even in the event of the exposure being sixty to one hundred times too long," namely:—

Water	3 ounces.
Cold saturated solution of soda carbonate	1 ounce.
Ten-per-cent pyrogallic solution	60 to 80 minims.
Ten-per-cent. bromide of potassium solution	⅛ ounce.

My plate having had only fifty times too much exposure, I slightly diminished the bromide. The development started at once and proceeded rapidly, giving me a dense but brilliant negative of excellent colour—if anything rather under-exposed.

As Dr. Eder says, this developer is, in extreme cases, "of the utmost value."

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PHOTOGRAPHS AS RECORDS OF THE PAST.

By John G. Horsey.

In the pursuit of health and pleasure it has been my custom during the last four years to ramble upon my tricycle along the roads and lanes of Kent and Surrey. It is not my purpose to here attempt to describe their well-known beauty and the unlimited food they yield for the camera, except so far as is necessary for the subject upon which I write.

During my peregrinations, more especially in and around my own neighbourhood, I have been much struck with the constant changes taking place in the suburbs of our great city. What was four years ago a beautifully-secluded, narrow country lane, dotted here and there with picturesque, ivy-covered cottages, is now a broad, stone-curbed street of straight, regular, ugly houses with nothing to boast of but weed-covered patches called front gardens, and broken windows—monuments to perpetuate the confidence of capitalists in "jerry" builders! Farther away, what was the happy resort of contented villagers is now stripped of its trees, cut up into roads and railways and building plots; dotted with detached and semi-detached "villas" of all kinds of questionable architecture, in the midst of which stands the temporary iron church, and the usual row of unprofitable shops awaiting tenants in addition to the despairing grocer and draper, chemist and fruiterer already "in residence." These are the constantly-occurring changes during life's struggle, and it is these changes that bring to my mind the great interest with which photographic representations of what *was*, compared with what *is*, must always be regarded.

I often think that if we could today look upon photographs of the immediate suburbs of London fifty years ago, with what wondrous eyes we should regard the now busy urban thoroughfare as it then appeared. Of course there is no such record, but the photograph of to-day may—nay must—fifty or a hundred years hence, prove a valuable and most interesting record of the past. It will illustrate to our children and our grandchildren the appearance of their place of sojourn when their parents, and *their* parents before them, lived and thrived. They will say, "Look at this picture; see, it was taken seventy years ago," and, from the explanation upon it, represents this very spot! Here, where all is bustle and activity, was then a rural nook far away from the crowd which has now reached and turned it into a part of the great whole!

Such are the thoughts I write of, and I say that we landscape photographers should one and all place upon our productions their date and such a brief description of the spot, and its position with respect to some landmark not likely to be lost, as is possible with a view hereafter to its being recognised in spite of the great changes which will then have taken place; and I am the more inclined to suggest the advisability of so doing from the fact that I am able here in England, in 1884, to recal the exact days upon which I took negatives in and around Sydney, N.S.W., twenty-three years ago. If it were possible to revisit Australia I should no doubt find the scenes of these labours now the centres of busy towns, and my still existing photographs interesting records of the past.

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TRUE SCALE IN PHOTOGALVANOGRAPHY.

By W. H. Harrison.

In map-printing, also in the reproduction of engineering and other scientific drawings by photographic aid, it is essential that the results shall be true to scale. In 1862 the English Secretary of State for War published the method in use in the Ordnance Department of reproducing maps at Southampton. Major Hannot, of the Belgian Military Map Department at Ixelles, near Brussels, has officially reported to his Government that the English plan has been tried in his "installation," as it is called in Brussels, and that the results were not true to scale.

The method which is now employed in Major Hannot's department at Brussels is to print the map from a negative on sensitised carbon tissue, and to lay the exposed tissue, quite dry, face downwards, upon a sheet of copper; four sheets of dry blotting-paper are then laid upon the back of the carbon proof, and upon them again four sheets of wet bibulous paper. Next, without a moment's delay, the whole is subjected in a hydraulic press, actuated primarily by steam, to a weight equal to that of 200 atmospheres. By the time the gelatinous tissue is damp it tries to expand horizontally, but cannot under this pressure; consequently, when the positive is developed on the copper sheet, it is true to scale. The duration of the pressure is half-an-hour.

A great hydraulic press of this kind would be expensive in a private establishment, yet so valuable is the plan found to be that costly substitutes for it are used elsewhere in Brussels. For instance: at the establishment of M. A. de Blochous, President of the Belgian Photographic Association, I saw a heavy screw press for the purpose, half the size of a four-post bedstead, but he had no hydraulic pump. When the proof was screwed down by hand by means of the double-lever handle of the press, a thick bar of iron, perhaps five feet long, was placed in one of a series of holes round the base of the screw, and a man by pushing horizontally with his whole weight against the other end of the bar increased the pressure by the powerful leverage, on the same principle that a capstan is turned on board ship.

Surfaces brought together under pressure, after having been newly coated with infinitely-thin films of caoutchouc deposited from solution, are said to bear wetting without expansion of the design. India-rubber, however, is one of the best non-conductors of electricity known, so cannot be beneficial on a plate on which it is intended to deposit copper by galvanic action.

For small proofs possibly an exceedingly strong screw copying-press, of the best type, might answer.

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SUGGESTIONS TO AMATEURS.

By G. T. Grammer.

First.—To well peruse and digest Mr. H. P. Robinson's two excellent works, *Pictorial Effect in Photography*, and *Picture-Making by Photography*, especially the former, and to apply the principles contained in them when choosing the point of view, &c., in the field; also to read a few handbooks on art, such as Green's *Hints on Sketching from Nature*, Rowbotham's *Art of Sketching from Nature*, and others, from which the amateur will derive much useful information.

Secondly.—For such subjects as consist of pure landscape use slow plates, such as Wratten and Wainwright's "ordinary" plates, which, in my hands, require about three times as much exposure as a so-called "ten-times" plate. These plates with slow development yield bright, plucky negatives. For developing I always use ten-per-cent. solutions —one bottle containing sulpho-pyrogallol, one ammonia, and one bromide. I find the table at the end of last year's Almanac giving the proportions calculated for several makers' plates most useful; also Mr. W. K. Burton's table of comparative exposures in the same Almanac. For lifting the plate out of the developing tray I think there is nothing so handy and clean as an ordinary toothpick.

Thirdly.—To note in a lexicographical memorandum book such matters appearing in the weekly photographic journals as may be likely to be useful; also to jot down references to the articles *Where to Go with the Camera*, and reports of excursions by the provincial societies, &c. These notes I have found very useful.

Fourthly.—One cannot be too careful in looking to the condition of dark slides, as nothing is more annoying than to have an otherwise faultless negative completely spoilt by dark bars across the picture, caused by the slides letting in light.

Lastly.—If the amateur wish to get photographic views of the royal parks and gardens—such as Hyde Park, Hampton Court Gardens, &c. —he should apply to the Commissioners of Works and Public Buildings, Whitehall Place, for permission to do so; otherwise he will not be allowed to take such photographs. The permit is made out for a period of six months.

A SIMPLE METHOD OF PREPARING OPAL PLATES FOR ENLARGEMENT.

By H. Holman.

To prepare a batch of really good opal plates a good emulsion, good glass, and a good developer are required. In my own practice I have found, with a little modification, the following formula, from the Almanac of 1883, to answer admirably. For the benefit of those who are not familiar with emulsion making I may give it in brief:—

No. 1.

Bromide of potassium	84 grains.
Iodide of potassium	5 ,,
Gelatine (Nelson's No. 1)	10 ,,
Nitrate of silver	120 ,,

Test the chemicals for acid, and be sure they are no more than slightly acid.

No. 2.

Nelson's No. 1.	100 grains.
Dresche's gelatine	60 ,,

Dissolve the bromide and iodide in one ounce of water, the ten grains of gelatine in one ounce of water, and the silver in half-an-ounce of water. Mix the silver and gelatine hot. Heat the bromide also, and add it little by little; shake well, boil for fifteen minutes, and lay aside to cool. Meanwhile, prepare the bulk of the gelatine by washing in six or seven changes of water. Dissolve, mix at 90° Fahr., and shake well. Lay aside to set and let it ripen for twenty-four hours. Squeeze through canvas into a large bowl, using the canvas as a drainer, thus:—Slip the canvas over the edge of the bowl, pull both ends tight, and you have a squeezer, washer, and drainer all in one. Fill the bowl three or four times and stir each time with a glass rod, after which the emulsion may be considered washed. Add three drachms of pure alcohol, and make up the bulk to six or seven ounces.

To prepare the glasses use no substratum, but clean the plates carefully till the water flows evenly from them. Beware of dust, and dry on clean blotting-paper.

The coating is the same as for ordinary gelatine plates, only with opal less emulsion is required; therefore, pour off the excess, and dry the plates spontaneously.

My box is a plain one with holes at top and bottom, covered with paper light-traps. When not over-crowded the plates will dry uniformly, and free from spots and markings.

The next operations are the exposure and development. Enlarging is so simple with bromide plates or paper that it need not be described. However, a short-focus lens is a consideration, as it gives a bright image, which conduces to a brilliant picture. With a good north light the exposure will be from forty to sixty seconds.

Various tones can be had with different developers, but for beautiful, black tones the following is a sure and simple developer:—

Saturated solution of oxalate of potass (neutral)	4 ounces.
Saturated solution of ferrous sulphate	1 ounce.
Bromide of potassium	10 grains.

Fix in hypo. one ounce, water six ounces.

Of course, there is nothing new in all this; but it is a simple and really beautiful process, which anyone may easily master.

ON ENLARGED PICTURES UPON GELATINO-BROMIDE PAPER.

By C. Alfieri.

Now that the season for outdoor photography is closed, I know of no other branch of our art-science calculated to afford more interesting occupation of an evening's leisure than enlarging by artificial light upon opal plates or bromo-argentic paper; and, although I am afraid I have little that is new to communicate upon this subject, I am induced by the Editor to give a few details of my own method of manipulation as a guide to my brother amateurs.

The first thing necessary to successful results is the possession of an optical lantern of suitable dimensions, fitted with condensers not less than four and a-half inches in diameter. To this may be adapted a portrait lens of about four and a-half inches focus from the back combination, supplied with a metal tube of rather larger diameter than the condensers, capable of extension to five or six inches in front of the lantern. The next desideratum is a three-wick paraffine burner, which must be soldered to a suitable reservoir, and have a six-inch silvered reflector at the back placed as near as possible to the lamp chimney, and carefully adjusted to the optical centre of the condensers, which consist of two plano-convex lenses mounted in a wooden cell, flat sides outwards. The condensers must be placed in an aperture behind the frame holding the negative, and as close as possible to it, but in such a way as to allow of their being easily removed for the purpose of being cleaned, or freed from watery vapour which is apt to collect upon them.

The lamp should not be fixed to the bottom of the lantern, but must admit of adjustment to the condensers in order that the brightest and clearest light possible may be obtained without getting an inverted image of the flame upon the focussing-screen.

The negative to be enlarged must be placed in its support, and adjusted carefully in front of the condensers, film side towards the easel, supporting a piece of smooth, white cardboard on which the picture is to be focussed. This easel, which is by no means an unimportant part of the apparatus, I will now try to describe. A perfectly-level board about twenty inches square is mounted between two upright strips of wood, after the fashion of an ordinary swing looking-glass, and capable, like it, of forward or backward motion. To the front of this board is attached by hinges a thin, square frame grooved like a slate frame, the dimensions of which must, of course, be adapted to the requirements of the operator. My own measures fifteen inches square, and is fitted with cardboard discs sliding in and out of the grooves, and having apertures, cleanly cut, of various shapes and sizes. At the lower side of each disc is fastened a thin, grooved strip of wood or cardboard of the same width as the sheet of sensitive paper or plate to be used, which is held by it in such a position that the picture is properly centered. A piece of white cardboard is now placed behind any disc selected, and the frame is turned up so that it lies flat against the easel board, to which it is fastened by a small wooden button.

After the image has been carefully focussed the hinged frame is let down again, without disturbing the easel, and the focussing-screen replaced by a piece of gelatino-bromide paper. After exposure the frame is again let down and the paper removed for development, without in any way interfering with the focus already obtained, or with the position on the easel of each succeeding piece of sensitive paper or plate. In order that the size of the pictures may be varied, the easel is made to slide along the base-board on suitable runners, to which it may be clamped at any distance from the lantern.

If the portrait lens be a good one it will not be necessary to use a stop smaller than an inch in diameter, and even the full aperture (in the case of dense negatives) may often be employed with advantage. With the arrangement I have described and a thin negative, the exposure upon bromo-argentic paper, at a distance of two feet from the lantern, requires a period of from ten seconds to a minute with the full aperture of the lens, and four times as much with the same aperture at twice that distance. The exposed paper, after removal from the easel, must be floated for a minute in a dish of perfectly-clean water, after which it must be quickly drained and laid face upwards in a developing dish used exclusively for the purpose, and flooded with a developer composed of the following stock solution :—

No. 1.

Neutral oxalate of potassium	1 pound.
Boiling water	2½ pints.

No. 2.

Protosulphate of iron	1 pound.
Citric acid	½ drachm.
Boiling water	1 pint.

Take of solution No. 1, when cold, four ounces, to which add, in the order named, one ounce of solution No. 2. This is the ordinary ferrous oxalate developer. Pour the above, with a sweeping motion, over the picture in the dish, rocking the same to and fro until the details begin to appear.

If the paper or plate have been properly exposed the picture will appear faintly in a few seconds, and gradually acquire the proper amount of intensity; but, if over-exposed, will flash out quickly and become rapidly dark all over, appearing as if seen through a mist, and altogether destitute of artistic qualities.

Assuming the proper exposure to have been given, the picture will appear with suitable gradations of light and shade, possessing, after fixation, the colour of a good engraving. It should be removed from the developer as soon as a fair amount of intensity has been obtained, as it will appear somewhat darker after fixation in the hypo. bath, which may be made of the strength ordinarily used for silver prints.

Before fixing, the picture should be well rinsed under a tap provided with some contrivance to spread the stream of water, and then immersed ten minutes in the hypo. solution referred to above. This done, it is well rinsed and immersed for five minutes in a bath composed of the following, used cold :—

Alum	4 ounces.
Citric acid	1 ounce.
Boiling water	1 quart.

The picture is finally washed on a glass plate, under a flow of water, by dabbing it on both sides with a clean, soft sponge, soaking it in clean water, and again sponging at three intervals of an hour each. The work is now pinned up by the corners to dry, and may be afterwards pressed between the leaves of a book, or mounted and rolled like ordinary silver prints.

I may add that, if the negative used for enlargement be sharp and perfect, enlargements up to five or six diameters may be made from it with perfect success, the resulting pictures possessing roundness of image and sufficient sharpness, an agreeable colour, and, in fact, every artistic quality that can be desired.

In conclusion: I would urge the greatest care and cleanliness in all the operations described, and would recommend that the ferrous oxalate developer be mixed fresh for every batch of enlargements; also, that the same baths of alum and hypo. be not used day after day, because the first-named solution decomposes very rapidly, and the two latter, if old and discoloured, will inevitably destroy the purity of the high lights of the picture and spoil the work.

It will, of course, be understood that all the manipulations I have described, from the moment the sensitive plate or paper is prepared for exposure, must be conducted in a ruby or other non-actinic light. The pictures may, however, be examined by gaslight after they have been removed from the hypo. fixing bath. Thin negatives, provided they are quite sharp and clear in the shadows, are the best for the process described.

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THE CAMERA AT WATERFORD.

By John Lewis.

It may be somewhat interesting to the numerous readers of the Almanac to hear of an amusing incident which once occurred to me in my search for the picturesque.

On a trip from Glasgow in a steamer called the "Dunmore" (now, alas! no more) we called at Waterford, and the thought struck me that Barron Strand-street would form a good subject. It is a long street, rather irregularly built, and crammed with itinerant vendors of all sorts of things. Some of the groups are exceedingly good, but the difficulty is to photograph them. I induced three passengers to go with me to see the sport. As soon as the camera appeared upon the scene the excitable South of Ireland blood began to bubble. Windows were thrown up, doors were opened, carts and horses were left to take care of themselves, and loads were abandoned to lie upon the ground—all this because a small camera had been erected in the middle of the street. The crowd augmented, and waxed inconveniently inquisitive as the focussing progressed. The picture on the focussing-glass was very funny. I intended to begin with a view of Barron Strand-street, but there was nothing to be seen except a mass of faces of all sorts, sizes, and descriptions, and in all shades of dirt and rags. There were old "ladies" with big, Irish clay pipes in their mouths, a coal heaver about half drunk and with a very shiney black face, millers, sweeps, ragged boys and girls, and at the edges of the screen one or two very dignified faces of the Royal Irish constabulary.

I focussed as well as I could, but as it was hopeless to attempt the street I thought I would try the faces. I shouted that if they would move off a little I would take their photographs. They moved a little, but after I had inserted the slide and before I drew the shutter I made a false attempt to take them by removing the cap. This I did to see the effect. It was magical. Immediately I took off the cap a rush was made for the lens to take a peep down it. Matters were getting exciting. I rallied my three friends around me, and we managed, by the assistance of some of the police, to get down the street and out of the crowd. We were, however, escorted to the ship by the police and a respectable number of the crowd.

I have not tried photography in the South of Ireland since that time, but I do not think I shall be discouraged by the failure. I shall try again when I have the opportunity.

I should like to mention, for the benefit of your readers, that I have never found a plate deteriorate from being at sea. I have not taken any extraordinary precautions, but I have succeeded in getting some very good negatives from the deck of a ship. Last September I exposed some plates on Kirkstall Abbey, near Leeds, and carried those plates to London by train, from London to Glasgow by sea, and from Glasgow back to London by sea, in the ordinary double slides. I exposed other plates at sea. I developed eight a few nights ago, and, although the negatives differed somewhat in quality, the sea air had not affected the plates in the slightest degree. I do not doubt that plates might be affected in the tropics, but my experience is confined to these latitudes.

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DARK-ROOM WINDOW ADJUNCT.

By G. G. Mitchell.

Some time ago I devised a simple arrangement by which I was enabled to judge with increased accuracy whether or not the development of a negative had proceeded far enough.

In developing either by transmitted daylight or by lantern the operator generally permits the whole extent of his window or lantern pane to remain unaltered during the operation, so that when holding up his negative for examination his eye is much incapacitated for arriving at a true estimate of density by a superfluous amount of diffused light. To obviate this I took a large sheet of cardboard and cut an opening in the centre of it the size of the plate to be examined —in fact, made it similar to a cut-out mount—and when I had proceeded, as I imagined, far enough with development, I placed this cardboard screen over my window, which was then practically contracted to the size of the negative, thus cutting off all light but that which passed through the plate I desired to examine.

A trial of this plan, I think, will at once show how much it assists the operator in determining either to stay development or to continue it. I have found it extremely useful.

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DEFECTIVE PHOTOGRAPHIC BACKGROUNDS.

By F. A. Darlow.

There appears to be a common error in which many background painters indulge when producing these necessary accessories to the photographer's studio. They are often designed and painted with the sides and corners considerably darker than the centre, and this arrangement tends to increase the deficiency to which all lenses are subject in "not giving comparatively equal density and definition all over the plate." The corners, being the furthest points from the centre, suffer first. Sometimes this is occasioned by the presence of an overhanging tree, a clump of bushes, or a half-obscured rock peeping out from the gloom; in other cases (interiors, for instance) a heavy curtain or deep shadow proves equally troublesome, and tends to expel much life and brilliancy from the finished photograph. Should the operator desire to take a negative that involves "stretching" the lens a little the defect is at once painfully magnified, and not infrequently the plates have a share of abuse bestowed on them and are said to be unevenly coated, or the lens is pronounced to be faulty, while the chief cause escapes unobserved.

Notwithstanding the perceptible improvement in the majority of backgrounds now in the market, there are *many* having the above-mentioned defects. It therefore behoves each purchaser to pay attention to more than the mere picture portrayed on the canvas, or he will find himself possessed of an article more ornamental out of a photograph than in one.

ON COPYING.

By W. M. Ayres.

I read with some interest the editorial article upon copying which appeared in the Journal some weeks ago, and I propose to make a few remarks thereon.

First, I do not agree with the strong side light. I usually use a south-west light—say to copy a *carte* or cabinet. If highly glazed I pour over the picture plain alcohol, which prevents the reflection entering the camera. I also frequently coat the surface with thin plain collodion, which entirely fills the grain of the paper and leaves the surface of the *carte* in excellent condition for copying or enlarging.

Should it be an unmounted print of any size up to 12 × 10 I use gum arabic of about the consistence of cream, which I pour upon a sheet of plate glass and then squeegee the print into contact. Then I place another glass the same size over the back of the print and secure the whole together by two india-rubber bands. When copied the print will immediately leave the glass if placed under a small stream from the tap. Then well wash, and place between blotting-paper.

Coloured unmounted photographs require different treatment, and are more troublesome.

Oil paintings, when I do them at home, I always sponge with good stout. This kills the shining spots. I also give the blues and whites a second or a third touch should they require it.

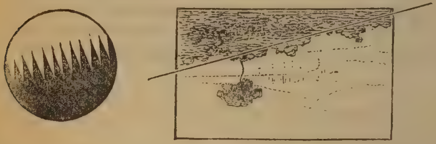
THE PENUMBRA SKY-SHADE.

By Walter B. Woodbury.

There is no finer view (or one more difficult to obtain) of the beautiful city of Naples than that from a point a little below the convent of San

Martino; but anyone taking this particular picture is liable to be accused of plagiarism by those who know no better. The fact is that it can only be obtained from a point where the camera stand can only be moved a foot or so from side to side. In consequence, all photographs that have been taken bear the same unmistakable sign of similarity in point of view if in nothing else. As I have said, it is an extremely difficult view to take, and requires a certain amount of dodging of some sort to obtain a presentable result. The foreground is made up of a garden with some vine trellises, backed by a fine specimen of the particular pine known as the "Turner" tree. This foreground is generally in deep shadow, and beyond it in the second plane the city and bay of Naples, backed by Vesuvius, lie bathed in strong sunlight, some half-mile intervening. Now, if this view were taken in the ordinary way, failure would naturally be the result.

To meet the difficulty I constructed a special cap out of cardboard to go over the front part of the lens, bearing the form annexed, and which I could turn to any angle I chose, the angle for this particular subject as well as an outline representing the view being shown. An exposure of fifty seconds was then given to the foreground, the cap removed, another five seconds given for the distance, and yet, although one part of the picture had ten times the exposure of the other, no one could discover the penumbral line. Ths sketch is reversed to show its relative position to the stop and as it appears on the ground glass. The dark part of the circle represents the opaque portion of the stop.



I used the same cap several times with equally good effect. A very easy contrivance would enable the serrated disc to be raised or lowered so as to shut off more or less of the distance. I overdid it once, the result being that my aërial perspective was reversed, the distance appearing close to, while the foreground looked miles away.

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TOURISTS' ACCESSORIES.

By George Kemp, M.D. (*Cantab.*)

The following artifice, although exceedingly simple, has been found so useful by the writer that he ventures to submit it to the readers of the Almanac.

It is now almost universally admitted that gelatino-bromide dry plates will keep unimpaired for weeks after exposure; still, in most cases, it is desirable to develope as speedily as possible, especially when a failure can only be remedied on the spot.

For development dishes are, of course, necessary, and, although ebonite dishes are very light, their form is not well adapted to packing. In the description which follows a very simple method will be offered for making these implements so as to occupy very little space with the additional advantage of lightness.

The substance employed is the laminated lead that is used for placing under the paper on damp walls. This can be turned up at the edges exactly in the same way as the paper is turned up in many paper processes, and an extempore dish immediately formed. Four of such dishes are amply sufficient for the ordinary gelatine process, and when they have fulfilled their duty they can be easily flattened out and packed away for future use. This laminated lead can be purchased at any paper-hanger's, and as it varies in thickness a selection should be made of suitable strength to retain the form.

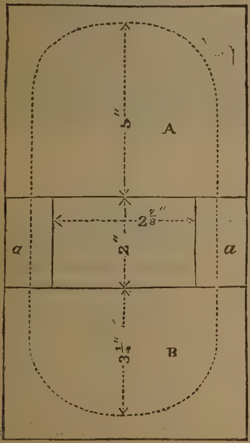
It often happens that a funnel is needed, and this is an awkward traveller, but can be extemporised by folding up the sheet lead as an ordinary paper filter and cutting off the end of the cone, when it can be used as a support to an ordinary filter or for the purpose of transferring a fluid from one vessel to another.

The two portions of most double slides in use are fastened together by means of brass clasps, usually placed near the upper end, and after long-continued use a very perceptible warping takes place; such an accident has happened to the writer. As a successful remedy a leaf of the thin laminated lead was inserted between the two portions of the slide. By placing the clasps in the middle of the slide such an accident cannot occur.

SUBSTITUTE FOR DROP SHUTTER.

By J. A. C. Branfill.

Having left home without my drop shutter for two lenses of about three inches diameter, I had a substitute made for half-a-crown by a country carpenter. The idea was suggested by an extract from the *Photographic Times*, I think, which I saw in The British Journal of Photography. It consists of a piece of mahogany $12 \times 4\frac{1}{4} \times \frac{1}{2}$. In this a hole is cut $10\frac{1}{4} \times 3\frac{3}{8}$ with semicircular ends, which is shown in the sketch by the dotted lines. This hole is partially covered on one side with thin pieces, A and B, of mahogany as in the diagram, and a rebate is formed on each side of the aperture left, by small pieces, *a a*, screwed on flush with the cover pieces last mentioned.

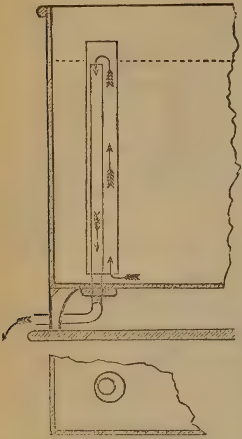


My method of using this is (having first arranged the camera for exposure) to insert a blackened card in the diaphragm slit, and draw out the shutter of the dark slide. Then I hold the three and a-quarter-inch cover piece, B, against the front of the lens, the aperture being above it, withdraw the card and insert the diaphragm, and expose by drawing the aperture across the lens, quickly or slowly according to circumstances; replace the card and close the dark slide. With very little practice I could use the substitute perfectly, and in a high wind I prefer it to a drop shutter.

WASTE PIPE AND AUTOMATIC SYPHON.

By W. Bedford.

Most of the water tanks now supplied for washing gelatine negatives are provided either with a tap or with an automatic syphon for running off the water. The former is difficult to regulate to a nicety, even with a constant stream of water, and the latter contrivance is open to the objection that the upper portion of each plate is left for a considerable time high and dry while it ought to be washing. The arrangement here shown has been designed with the object of meeting these disadvantages. It will be seen by the diagram that the waste pipe is attached to a hollow plug ground to fit a socket fixed to the bottom in one corner of the tank, and is surrounded by a metal tube soldered to it longitudinally which reaches nearly to the bottom, and stands somewhat above the upper end of the waste pipe. The waste water is drawn off in the direction indicated by the arrows. If an air-tight cap be fitted on to the open end of the outer tube it is converted into a compact, self-acting syphon, suitable for print-washing troughs, and there will be no risk of the prints being sucked into the waste pipe.



The Doulton ware sinks now in common use for photographic purposes would seem to lend themselves readily to this appliance, and with the stoneware waste plug surrounded by a piece of brass triblet tube of slightly larger diameter, and notched at the lower edge to allow the water a free passage, they would form very efficient print-washers.

◆

ON CAMERAS.

By Baynham Jones.

The camera of the present day is undoubtedly that for which Mr. M'Kellen obtained a medal at the late Exhibition of the Photographic Society of Great Britain, but as nothing is perfect in this imperfect world we must look forward, and our motto should be "Excelsior." I have, therefore, ventured upon a few suggestions tending to that end. As you justly observed in a late article, ground-glass slides are almost invariably placed with the smooth side outwards. Now, what could have induced the inventors of cameras to adopt this plan I cannot conceive, nor can I understand why it has been almost invariably followed by other makers. There can be no question that it is detrimental to the operator, as every object in front of it is reflected by the smooth glass, which reflection sadly interferes with perfection of focussing, and I do not see any advantage it affords over placing the glass in its opposite position.

The method of using a double slide on the camera front for altering the position of the lens is both complicated and inconvenient. I can strongly recommend a plan which I have employed for many years, but which I have only seen used once, and that was by Mr. H. Owen, a very noted photographer in the days of calotype. I allude to two angular slots in the front, through which work screws attaching it to the camera and allowing the front to slide both vertically and horizontally. This permits of a very much greater range of movement than the double-slide method. It has but one defect that I am aware of, and this is that it does not provide for lowering the front, which is sometimes required when taking views from a height. This defect I have overcome within the last few days, and I now consider the method perfect. The alteration is simply the addition of an extra screw-hole to each slot, and the removal of the screw thereto when you require to depress the lens.

FIG. 1.

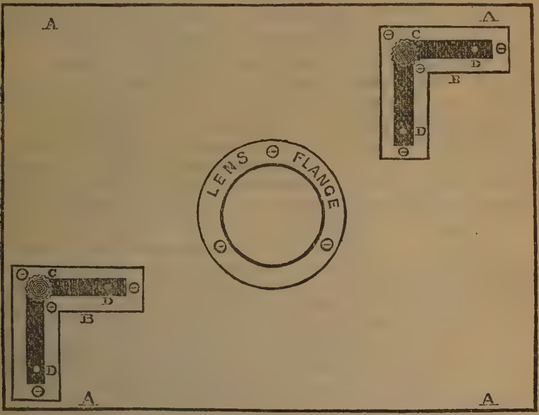


Fig. 1. A A A A is a loose camera front which has two angular slots B B passi through it at two corners. C C are milled-headed screws passing through this slide into the inner board, which enable the outer slide to move perpendicularly and horizontally. D D D D, holes to which the screws are removed in order to lower the slide.

FIG. 2.

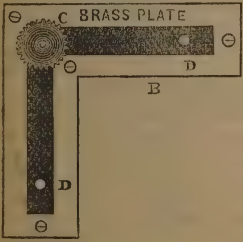


Fig. 2 is simply an enlargement to full size of one of the slots.

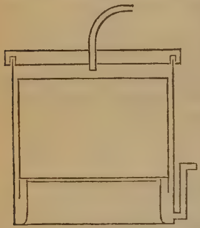
Another suggestion is that in order to prevent the markings caused by the leather or india-rubber cloth joints of the camera slide, parchment should be substituted. It is a most durable material, easy of manipulation, and quite light-tight when stained black.

Lastly: there are few photographers who would venture to deny that on more than one occasion they have lost the cap of their lens, and in that case my verdict would be "sarves him right" when a remedy is so self-evident. My plan is to screw a small brass eye into the lens mount, pass a fine cord through the eye and make a knot, and then carry the other end of the cord through the centre of the cap from the outside and make another knot; and in order that there be no possibility of light entering at the hole paste a disc of black silk about the size of a three penny bit over the knot. The cord should be about three or four inches in length.

AN APPARATUS FOR WASHING EMULSION.

By J. J. Acworth, F.I.C., F.C.S.

A handy apparatus—one which could safely be exposed to daylight and, at the same time, easily made—for washing emulsion might possibly be a *desideratum* to many. The one about to be described will, I think, be found to answer the above requirements.



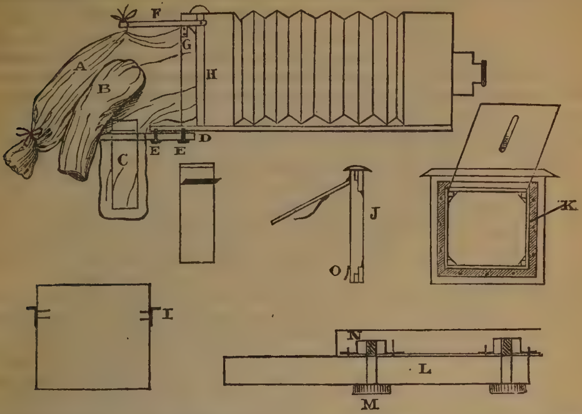
At first I tried to make it in earthenware, but the difficulty of boring it was too great, so I had recourse to copper. At a coppersmith's I procured a ready-made, flat-bottomed cylindrical dish without a lid. An ordinary copper stew-pan with the handle taken off would answer the same purpose. At the bottom of this dish I fitted into it, as the outlet pipe, a piece of tubing soldered at right angles twice, as is shown in the annexed diagram. I find a hair sieve to answer every purpose for holding the emulsion during washing, and the sieve I rest on a brass ring elevated on thick brass wire legs, such as could be easily made in a few minutes. This apparatus is covered with a hard wooden disc about an inch thick, a groove about three-eighths of an inch deep and one-eighth of an inch wide being turned on the under surface so as to fit the top of the copper vessel. This is quite light-tight, and can be placed on instantly.

A metal tube, of course, passes through the wooden covering so as to admit a stream of water to play upon the emulsion. As a further precaution, the whole of the under part of the wooden covering and groove should be painted with optician's dead black.

A CHANGING BAG FOR DRY PLATES.

By Thomas Irving (Parel, Bombay).

I send you a rough sketch of a changing bag which I think will be of some use to photographers. I had a bag made of two thicknesses of black velvet and lined with silk. A, the bag. B, the sleeve. C, the place for the plate-box to fit in and rest on struts D. E E, the screws for holding struts D to the bottom of the camera. F, two supports on each side of the camera to support the bag and keep it clear of the plate when changing. G, pins for F to rest on; when F is not in use they can be turned back out of the way. The line H, the plate holder. I, the two small, thin, brass flanges fastened to the plate-box so as to support it on struts D. J, the plate-holder; it is not a dark slide, for no dark slide is required, but simply a plate-holder made to fit in the place of the dark slide. K, the strips of brass that fasten the bag to the plate-holder; they are about three-quarters of an inch wide by one-sixteenth of an inch thick, and are fastened on to the slide with screws. L, a large sketch of D. M and N, the screw and nuts; the screws are three-eighths of an inch thick.



The focussing glass is loose; of course, it is only a plain, ground sheet of glass. In using this form of changing bag there is no focussing cloth required, the bag acting as such. The working of the arrangement is very simple. I set my camera up on the tripod, slip my plate-holder in with the bag (of course, the bag is a fixture to the plate-holder), place the focussing glass in, focus the picture, take out the focussing glass, put the plate box into position, tie the mouth of the bag, put my arms into the sleeve, open the plate box, put a plate into the slide, close the back of the plate-holder, pull my arms out, then do the exposure, put my arm in again, take the plate out, put it into the box, close the box, open the bag, take it out and put the focussing glass into it, place in the plate-holder, slip the slide out, fold the bag on it, shut the camera up, and make a start for the next picture.

I have used this bag for some time and in the hottest month in India, and never had a plate to fail me.

* * *

A READY WAY OF DRAWING LINES CORRECTLY ROUND A MOUNTED PRINT.

By Joseph Paget.

The effect of a photograph mounted in an album is greatly improved by drawing a line round it in the form of an Oxford frame.

Not only ought it to be equidistant from the print, but the projecting ends of the lines should be of the same length as that distance, which we will call x. In order to effect this quickly and correctly, having decided what the distance shall be, take a visiting card (*fig.* 1), and from one corner, A, mark x three times over on each of two adjacent sides. By drawing from these points three lines parallel to the sides of the card nine squares will be obtained. Cut away the rest of the card not included in the square A B C D, and also the square at A. If this be carefully done, and the print also square, the card will fit accurately on the print, as in *fig.* 2.

FIG. 1.

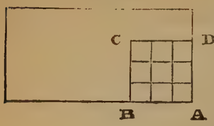
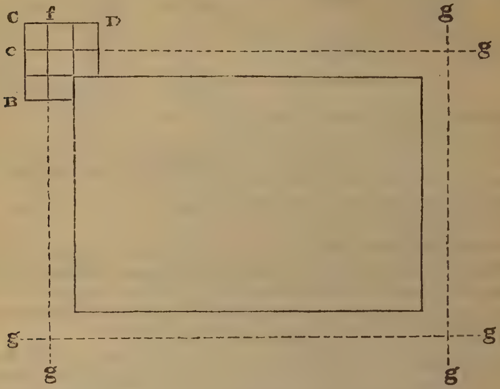


FIG. 2.



With a pencil mark the points *e* and *f*, and then, by placing the card on the other corners in succession, mark the points *g*. These will show correctly where the lines represented in the figure by dotted lines are to be drawn.

* * *

ENLARGING LANTERN.

By J. W. Reffitt.

I have pleasure in giving particulars of my enlarging lantern, for use in enlarging from negatives direct upon gelatino-bromide paper, or making an enlarged negative upon gelatino-bromide paper (to be afterwards waxed*) from a positive transparency.

The apparatus is plainly made of deal. The condenser should be six inches diameter, to take in fully negatives $4\frac{1}{4} \times 3\frac{1}{4}$, or this area out of a larger negative. The bellows, if purchased separately, should be half-plate size. A rigid quarter-plate camera (old style) answers well for a front part.

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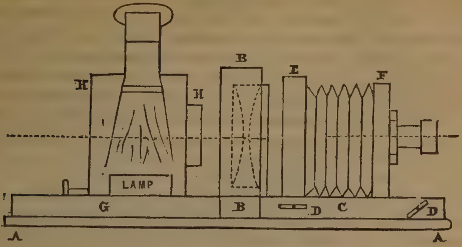
* The paper negative may be waxed by spreading wax thinly upon a warmed glass, and laying the negative upon it until the wax is absorbed. After this take off the excess of wax by ironing the negative between blotting paper.

FIG. 1.



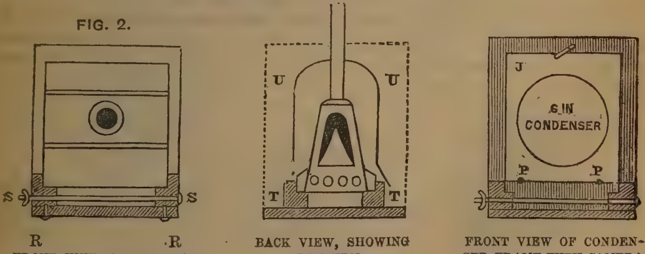
SIDE VIEW OF ENLARGING CAMERA.

A A, base-board. B B, condenser frame fixed to base-board. (Condenser in place shown by dotted lines). C, side slips or cheeks between which camera slides, and is clamped by bolts D D. See end view of camera, S S. These side slips are fixed by screws passing through base-board at R R (*fig.* 2). On one side the holes through which these screws pass are enlarged so that the slip will give when drawn up by bolts. E, back of camera, with vertical grooves, in which different-sized negative-holders can be slid down like an ordinary focussing-slide. F, camera front with lens fixed on cross slide, see also front view of camera. G (*fig.* 1), side slips, between which tin-plate lantern can be slid until adjusted to proper position before condenser. See also T T, back view of lantern. H H, tin-plate lantern enclosing four-wick paraffine lamp. See also back view, U U. J, condenser-holder, for six-inch condenser, of stout tin plate, with notches fitting on pegs P P in front of same.

NOTE.—Another condenser-holder for nine-inch lenses can be substituted for six inch, as shown; that is, it can be slipped upon the same pegs, P P.

After the camera is adjusted to give required image on white paper screen it is firmly clamped by the two wing nuts on bolts D D, *fig.* 1, drawing the side slips together, also front view at S S.

FIG. 2.



FRONT VIEW OF CAMERA.

BACK VIEW, SHOWING LANTERN.

FRONT VIEW OF CONDENSER FRAME WITH CAMERA REMOVED.

The lamp is a four-wick, by Hughes, burning paraffine oil. A good quarter-plate lens may be used for enlarging, with a card stop in front of lenses, aperture about three-quarters of an inch; but I have found nothing to equal a Dallmeyer's 8½ × 6½ rapid rectilinear.

ENAMELLED DISHES.

By Russell Sedgfield.

Yet another method of making dishes for development and other purposes! I get the dishes made at the tinman's in the usual way, with sloping sides for convenience of nesting. I then send them to an enamelled slate works, where they can be finished in white, black, or any other colour. These are far superior to anything of the kind to be bought at the shops, so far as yet I have discovered. The coating has not the slightest tendency to chip or peel, and is exceedingly durable.

I imagine the enamel is much the same as that known as Harrington's enamel, used for bicycles and tricycles. I am told by the workmen that they are stoved for about eighteen hours. I got some of the stuff, and tried to perform the operation in the kitchen oven, but it is difficult to maintain a suitable temperature; and as the stuff remains sticky for some time it is not easy to avoid dust, so that, although I got a tough coat, it was rather gritty, and the smell is not generally appreciated.

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A SINGLE LANTERN DISSOLVER.

By Thomas Gulliver.

Some eighteen months ago I borrowed from a friend a dissolver for my lantern, and found it to be in use as good an arrangement as any contrivance for that purpose which has come under my observation. I send a sketch for the benefit of the readers of the Almanac which will almost explain itself.

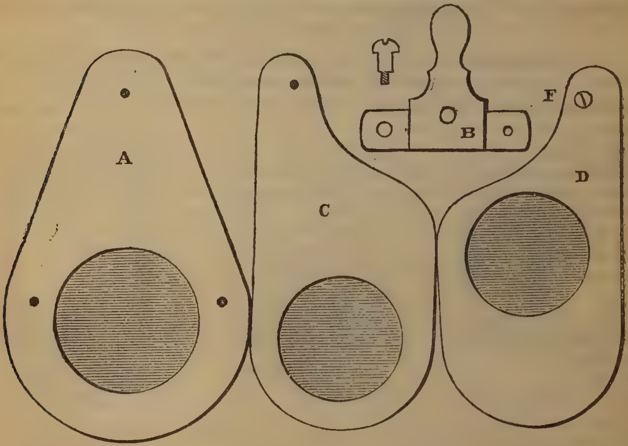
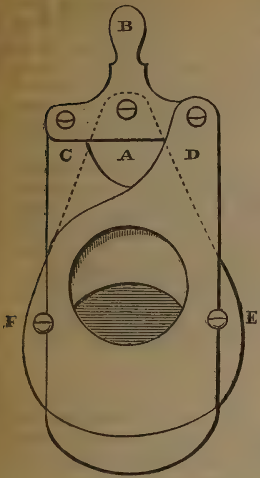


FIG. 2.

FIG 1.

FIG. 3,

FIG. 4.



The centre (*fig.* 1) is, like the two side pieces, of thick brass plates. It consists of four pieces—the centre A, the lever B (*fig.* 2), and the two slides C and D. The slides C and D are made to travel between the large rose-headed brass screws E F. The lever B is filed away on the reverse sides to give play to the slides, and the holes are made large enough to give sufficient play for the slides to work up and down without jamming. A ring of metal is soldered on to the back of A to slide the dissolver on to the object-glasses of the lantern. *Fig.* 4 shows the arrangement ready for use. A slight touch of the lever opens out the openings and the light is full on. By reversing the motion slowly the light is gradually shut off; the picture is then changed by means of a double slide-holder, and so on to the end of the entertainment.

I regret I cannot give the name of the inventor. I have not seen it in any price list that I possess, but it is very easily made. Four pieces of brass plate one-sixteenth of an inch thick, a good fret saw to cut it into shape, and five rose-headed brass screws are all that is wanted.

◆

THE HORIZONTAL SWING IN CAMERAS.

By S. D. McKellen.

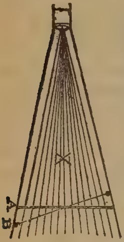
The Editor has honoured me by asking for a contribution on any practical subject; and, as I have often been asked what objection I have to the use of a horizontal swing in cameras, I think I cannot do better than say a few words about the subject.

There can be no question as to the value of a vertical swing, and probably my photographic brethren were never more convinced of this than during the past exhibition at the rooms of the Parent Society. A vertical swing, however, when used to obtain parallel vertical lines, has an exactly contrary effect to that produced by the use of a horizontal swing. By the vertical swing the desired result is produced by the part of the plate on which the nearer part of the subject falls being placed *nearer* to the lens, and thus the size of the objects on that part of the plate is diminished. Take, for instance, a building. If the camera have to be tilted the bottom of the building will be shown on the upper part of the ground glass considerably larger than the top of the building will appear on the lower part of the ground glass.

To give a more pleasing, and apparently truthful effect, the vertical swing back is brought into use, when by placing the ground glass in a perpendicular position the heretofore converging upright lines are rendered parallel. It is to be remembered that this effect is produced by diminishing the distance between the lens and the part of the plate on which the nearer portions of the subject is depicted, or by increasing the distance between the lens and the part of the plate on which the more distant objects are shown, or by a combination of both movements.

In using a horizontal swing a different purpose is intended. The object now is to enable the photographer to work with as wide an aperture as possible, and at the same time to get near objects on one side of the plate and distant objects on the other side in focus.

For instance: the camera is placed in position to take (say) the right side of a street consisting of buildings. Looking at the ground glass you find that you cannot with a fairly wide aperture get the near buildings and distant ones in focus together. In such a case I prefer to equalise the focus by using a small stop. But others prefer to use the horizontal swing, and so the left side of the ground glass (on which the nearer buildings are shown) is moved further from the lens, or the right side of the ground glass on which the distances are shown is put nearer to the lens, or the two movements are combined. By this means a fairly correct focus is sometimes obtained all over without much reduction of the lens aperture.



Now, what is the result of this? Just the contrary to that of the vertical swing in the case of the building already named. In the former case the vertical swing placed the ground glass parallel to the building, or in a vertical position. In the latter, by the horizontal swing, the angle formed by the ground glass and the line of buildings is greatly increased. In the former, by the vertical swing, the distant objects are increased to the same apparent size as the nearer ones, and a more pleasing effect is obtained. In the latter, by using the horizontal swing, the distant objects have their apparent size diminished in relation to the nearer objects; or, in other words, the distant buildings are smaller, the nearer ones larger than they ought to appear, and the true perspective is thus destroyed.

The sketch illustrates the subject. X is the cone of rays passing through the lens and falling on the ground glass A. The further the rays pass from the lens the wider apart they are; in other words, the further from the lens any given object is brought into focus the larger will that object appear, and *vice versâ*. Now, if the picture be in focus at A the true perspective is maintained, with the understanding that proper judgment as to the focus of lens is exercised.

When a side swing is used, as at B, one side is further up the cone of rays and nearer the lens, and the rays are nearer each other or the objects appear less; whereas the other side is further down the cone of rays and further away from the lens, and the rays are still further apart or the objects are shown larger—as much larger as the other side is smaller—than their appearance would be if the picture were brought to focus at A.

◆

A NEW DIAMOND-HOLDER FOR CUTTING GLASS.

By Andrew Bowman.

The peculiar sound emitted while cutting—not "scratching"—glass with a sharp diamond is not very audible if the diamond be rigidly held at its proper cutting angle. The line it cuts on the surface of the glass is scarcely visible. The quantity of dust produced by making the cut is next to nothing in amount and quite impalpable, and glass of ordinary thickness so cut should part easily without producing splintered particles.

The accompanying diagram represents in a rough way the principle of a new diamond-holder which, in conjunction with *suitable gauges*, is designed to enable manufacturers of photographic dry plates to cut down large prepared dry plates into smaller sizes with certainty, in darkness if necessary, and avoid loss from breakage by bad cutting, at the same time saving those of the profession who use commercial dry plates from one annoyance, viz., the quantity of course dust and splintered particles of glass so frequently found imbedded in the films of the smaller sizes of dry plates—the direct result of bad cutting.

The instrument consists of a stem with the button, *a* (*fig.* 1) screwed on its upper end, and the flat head, A—in which the diamond is set—at the bottom. The stem passes through the piece B C, the lower end of which is permanently attached to the guide D D at B (*fig.* 2), which both serves as a fulcrum and a centre on which the diamond turns. The movable end C is made fast, when the diamond is set at its best cutting angle by means of the milled screw C (*fig.* 2) behind the arc *e* (*fig.* 1) inscribed from the centre B. The spiral spring encircling the stem between B C raises the diamond clear of the base of the guide D D, when the stem is released from pressure at the end of each operation. *Fig.* 1 represents the diamond pressed down in contact with the glass. In *fig.* 2 it is raised by means of the spiral spring. The guide D D (which for lightness and rigidity is made of very thin sheet steel) shown in section by the broad black line (*fig.* 2) "to make it more conspicuous," is bent in at *f*, so as to touch the flat head A, and prevent it from turning round.

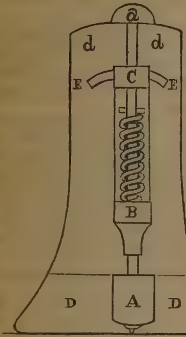


FIG. 1.

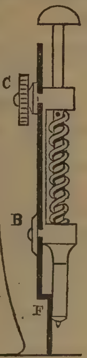


FIG. 2.

When in use the instrument is held between the thumb and second finger, using the forefinger to press down the stem of the diamond by means of the button *a*. The base of the guide D D, which is two inches long, being steadily held in contact with the surface of the glass along with the diamond, will effectually prevent the operator from cutting the glass at one part and scratching it at another by inadvertently raising or lowering his hand while drawing it towards his body, as he might easily do with the common glazier's diamond—working as he necessarily must in very dim red light while cutting very sensitive dry plates—and so reduce the loss by breakage through bad cutting to a minimum, and at the same time make sensitive films sprinkled with glass dust and splintered particles of glass a thing of the past.

THE CAMERA SCREW IN THE TRIPOD TOP.

By G. S. Penny.

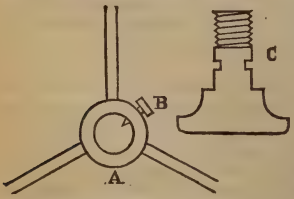
The amateur photographer who is of a modest nature is cautious how he writes to the Editor about every small convenience or improvement he may have hit upon in the course of his practice, lest he be accused of a fondness for "rushing into print," or from the fear of the sharp point of some "Free Lance." Such a weapon held *in terrorem* no doubt has its use in deterring those afflicted with a *cacoethes scribendi.* It seems, however, that it is sometimes better to run the risk of the critic saying—"Instruct not your maternal grandparent in the art of exhausting of its contents the calcareous integument of the gallinaceous ovum," rather than that a useful invention or discovery should be so shut up from the world in general as to be re-invented or rediscovered when a demand for it arises.

This certainly applies to a subject on the *tapis*—more correctly, in the field—at the present time. I allude to that of the quite obvious convenience of having the camera screw a "movable fixture" in the tripod top.

It is now many years (probably little short of twenty) since I contrived a remedy for the defect of a loose screw, which might very possibly be, and certainly had been on some such occasion, left behind; for I quite well remember being "once upon a time" in a state of distress from this cause, and being driven to whittle a stick as an extemporised substitute for the absent camera screw.

The way I provided against the recurrence of such an accident is explained by the accompanying diagrams. It will be seen that the centre ring of the metal tripod top has a small hole drilled through one side of it. This is tapped with a thread, into which is fitted a small screw with a cross-cut head. The camera screw being cut as far as required for the camera base plate, a groove is turned out of it opposite the small hole in the tripod ring. For use the camera screw is put in place, the small screw fixed up into the groove, and so is ensured from dropping out, while allowing it full play in securing the camera.

Another plan is one I have seen for years past used by my friend, Mr. Baynham Jones, and, I believe, originated by him. It is accomplished by tapping with a female thread the hole in the centre of the tripod ring, turning off so much of the camera screw as when *in situ* would be below the level of the tripod ring. When the screw is once passed through it can only be released by carefully unscrewing it. Each camera should have a plate on the base-board tapped to the same thread as the camera screw. This is the most convenient arrangement. Should, however, there be a necessity for a separate screw for each camera, by my plan it is only required to turn out the groove described in each screw, when one may be readily substituted for another at any time by means of a small screwdriver, or even a strong pocket knife.



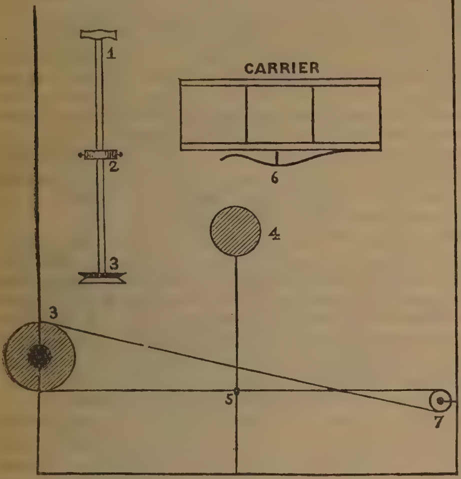
A, The tripod top. B, The small screw. C, The tripod screw.

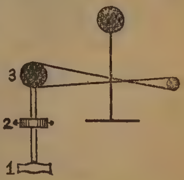
A NEW METHOD OF CHANGING LANTERN SLIDES WITHOUT BEING SEEN ON THE SCREEN.

By L. Dixon.

The arrangement to be described is adapted for lanterns where the slide is inserted at the top instead of the side. This form I prefer, as it dispenses with stretching the arm over to the other side, the slide being abstracted from the bottom instead ; also the change is effected with nicer precision.

The carrier is a fixture in the lantern. On its side a spring 6 is attached with a stud, which passes through the frame and presses against the slide. This pressure is effected by a round brass rod with a gimlet handle at one end, and about the middle is a wooden wheel 2 one and a-quarter inch in diameter, with two screws opposite each other having round heads. These screws, on turning the handle 1, press against the carrier spring 6 when the shaft is put in its proper place on the lantern side. At the other end of the shaft is a grooved wheel 3, two and a-quarter inch in diameter, round which a fiddle string is fastened at one end and carried through the inside of the lantern below the condenser to another small wheel 7 that is fastened to the opposite side of the lantern inside. An upright pillar of wood 5, three-quarters of an inch thick, is hinged to the bottom of the lantern in front of the condenser, about one and a-half inch from the jet. A disc of metal 4 is fastened on the upright pillar, exactly in the centre of the condenser. The string which crosses the inside of the lantern round each of the two wheels is attached to the pillar at the point where it crosses, and thereby gives the power, on turning the handle on the shaft, of tilting the disc of metal across the jet flame. Also, the moment the handle is turned the slide drops down, followed by another which finds its own place by the time the operator can turn the handle round to lock it with the pressure of the screw on the spring.





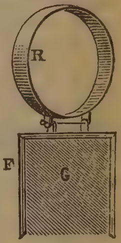
In order to adjust this method to lanterns where the slides go in at the sides, the brass rod with the handle on the end must be put through the centre of the lantern front parallel with the bottom. The wheel 3 should be where wheel 2 is placed, dispensing with the latter altogether. Also by this way wheel 7 is not needed. Two carriers will be required for moving the slides, one sliding within the other. A fiddle string is fastened at each side of the carrier and carried round the wheel on the shaft, which must be placed under the carrier. The other end of the rod is attached to the bottom of the upright pillar, so that on turning the handle both the carrier and pillar with disc is moved across the light, obscuring it the moment the slide passes. Any lantern can have this extra mechanism attached to it, so that it is not necessary to go in for a new one; neither is its use restricted by a patent.

A USEFUL ADDITION TO THE LANTERN.

By Anthony Philburn.

This cannot be patented, although better worth attention than many things that are patented. To be able to exhibit with one lantern nearly all the effects producible by two has long been a *desideratum*, but the unsightly appearance of the slides being jerked across the "field" has hitherto stood in its way.

To obviate this, and produce an effect almost equal to dissolving, have made at a tinsmith's a tin frame R, to slip on to the hood of front lens; F, a frame hinged to R, with G, a piece of ordinary ground-glass to slide and fix into F.



To use it have your carriers made to hold two slides, and so arranged that you can change one while the other is being shown. When you want to change turn up with your finger the frame F until the ground glass completely covers the lens front. Now the picture will be dispersed and the room filled with a beautifully-soft and diffused light. The carrier is then pushed quickly across and the next picture brought into view, the whole operation occupying about five seconds. The opaque parts of the slides will not be seen on the screen, and the effect is at once novel and pleasing. Much variety can be had from working the glass up or down or from either side.

Having had some experience with the beautiful but fickle ethoxo light, I here venture (notwithstanding the fact that we have it stated on such high authority that it is a workable light) to give the same advice to those who think of trying it as the blacksmith gave to his little boy, when about to pick up a piece of hot iron with his fingers—"Let it alone!"

SELF-REGISTERING PRINTING FRAMES.

By Chas. J. Hall.

As my contribution to the Almanac I have pleasure in offering a suggestion to the profession, which, though small in itself, has in my hands proved of very great value. I refer to the question of obtaining *exact* prints from negatives free from the slightest possibility of having moved whilst undergoing the usual process of printing.

Every one knows who has had any extended experience of this important branch of photographic work, that from various causes—such as the uneven pressure of the back springs, old and badly-fitting frames, carelessness of printers, &c.—numbers of prints, both large and small, are spoiled through the want of some means which will absolutely remedy these matters.

It was with a view to economise this item of expenditure that my thoughts were directed to the obtaining of a satisfactory result; and it was not until after many experiments that the following was discovered, which will be found as simple as it is an effective means of overcoming the difficulty referred to:—

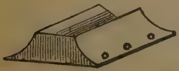


FIG. 1.

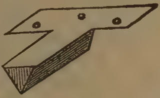


FIG. 2.

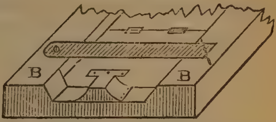


FIG. 3. Showing end section of frame with appliance in position.

Figs. 1 and 2 are small end-pieces, made of brass, fitting into each other. They are made wedge-shaped at the sides and outside end, and must be a perfect fit. *Fig.* 1 is closed at one end to prevent end movement. When in position these end-pieces are placed at the outsides of the frame ends, as shown in *fig.* 3. It will be observed that when screwed on in their respective positions—that is, *fig.* 1 on to the ends of the frame proper, and *fig.* 2 on the ends of the divided back fitting into same—these end-pieces do not interfere with the action of the back springs. This is due to the elevation of *figs.* 1 and 2, when socketed in each other, not exceeding in height the two side ribs of frame marked B B in *fig.* 3.

This method will enable anyone with little trouble and still less skill to make their own ordinary printing-frames perfectly self-registering with the utmost nicety. Its application, too, for combination printing would be of great value. But it is more especially intended to render the ordinary frames generally in use more serviceable in producing perfect prints, and free from any accidental double-printing.

Its value is of such importance as to have convinced me that a larger number of prints than I had expected to find are but imperfectly registered. Indeed, I might say, its use I have found absolutely necessary to obtain perfect register of negative to print during printing, as oftentimes, even with careful printers, owing to the smoothness of the varnish and sensitised paper when in contact, very slight movements are caused unknowingly when examining the prints, but which would be impossible by the use of the contrivance suggested.

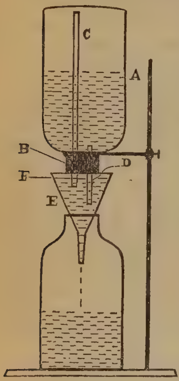
The best plan, to give the system a trial pending some such arrangement by the frame-makers, is to cut out in wood small patterns of *figs.* 1 and 2, and obtain castings from any local brassfounder. As only very light castings are needed, a quantity may be had at a trifling cost. The appliances should be screwed on in their respective positions whilst socketed together. Attention to this point ensures a perfect fit.

By the application of this plan I claim to avoid all possibility of end or side movement of frame back, giving absolute certainty, uniformity, and mechanically-correct print copies. I also claim economy in the use of sensitised paper, and, what is better still, the satisfaction of mind in being able to obtain with ease and regularity the most perfect prints any negative can produce without losing a single print through double-printing.

AN AUTOMATIC ARRANGEMENT FOR FILTERING.

By F. W. Hotham.

The following piece of apparatus was designed to do away with the necessity of incessantly filling up the funnel in filtering, with the attendant waste of time which might, perhaps, be better employed, and answers its purpose remarkably well, while the first cost is less than two shillings. It consists of a forty-ounces wide-mouthed bottle, A, fitted with an india-rubber cork, B, through which pass two glass tubes, C and D, of which C reaches almost to the bottom of the bottle, and projects about an inch or so outside, while D only just passes through the cork, but projects outside *about one inch more than* C. Upon this extra inch the working of the apparatus depends.



The liquid to be filtered is put into A, which is then inverted over the funnel, E, and supported in a strong retort-stand at such a height that the mouth of the tube, C, is about a-quarter of an inch below the level of the filter paper, F. The liquid at once rushes out through D and fills up the funnel till it closes the open end of C; when no more air being able to get into A through C, the liquid in the funnel rises in C to the level of the liquid in A, and the outflow through D at once stops.

Meanwhile the liquid in the funnel keeps sinking slowly until it gets about half-an-inch below the mouth of C, when the column of liquid trying to flow out through D overbalances, by means of its greater length, the column of liquid in C, which latter is sucked back into A with a sharp "pop," while the former flows out and fills up the funnel to the same height as before. This action repeats itself over and over again as long as there is any liquid left in A, the funnel being replenished as fast as the liquid filters through. The action being entirely automatic, the photographer can set it going and then leave it quite alone, secure that the filtering will go on steadily, without the funnel being once allowed to get dry or to overflow even if the filtering takes a week.

AN APPARATUS FOR MEASURING THE RAPIDITY OF SHUTTERS.

By Edwin Underwood.

Thinking that an easily-constructed apparatus (if it can be so dignified) for ascertaining the length of exposure given by rapid shutters might be useful to amateurs, I send a description of one I have made and use. Its cost is practically *nil*, and the amateur by its means will be able to tell admiring friends in the "how-much-th" of a second his instantaneous photographs are taken.

Take a small round bottle (mine is a one-ounce), and with a bradawl or nail push one end of a four-feet length of string down through the *centre* of the cork belonging to it, and paste a piece of black paper round the bottle. Next take three half-sheets of note-paper and paste together endwise, or a strip of white card of similar size. Fasten one end of a string to something convenient on the table, and at a distance of thirty-nine inches therefrom make a loop; place your pencil therein and describe an arc of a circle lengthwise on the card. This is to be divided into ten, fifty, or a hundred, according as it is desired to reckon in tenths, &c., with a distinct black mark.

Now for the method of using:—Take the string which is attached to the cork, cork the bottle, and at thirty-nine inches from the bottom of the bottle make a loop and put on a nail at a sufficient height on an outside wall or post *in a good light.* This forms a pendulum which oscillates exactly in one second, and the card is to be placed below it so that the bottle almost comes in front of the marks. The central mark should be just under the bottle when it is at rest. Place your camera (large aperture at this time of year, remember) in front, pose, focus, adjust the shutter, and insert a rapid plate. All being ready, the pendulum is set swinging by being drawn somewhat beyond the end mark, and when the oscillation has fallen so that it just reaches the end marks the exposure is effected. The exposure should not be made when the pendulum is at the limit of its swing, as then it is stationary for a brief period, but should be made just before it reaches the middle.

On development of the plate count how many of the marks the image of the moving bottle covers, and deduct the diameter of the bottle. This will give the number of tenths or hundredths of a second during which the plate was exposed. The pendulum may be lengthened to vibrate in two seconds, and, as the speed of the bob will be but one-half, the image will be more distinct in proportion.

[This can give but an approximate idea of the time of exposure, as the swing of the pendulum is not uniform, the rapidity increasing from the commencement to the centre of the beat and then decreasing again.—EDITOR.]

◆

WASHING PLATES IN THE DARK ROOM.

By R. J. LATHAM.

As my contribution to your ALMANAC, the following arrangement for washing plates in the dark room might possibly interest some of your readers.

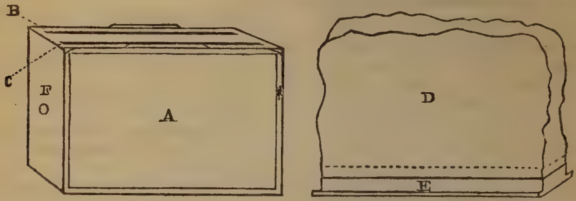
I had an old seltzogene head returned a short time ago, and, seeing it lying in one of my drawers, the thought occurred to me to fix up an old filter, from which the interior had been removed, by fitting one end of an india-rubber tube about a yard long to the tap, fastening it with wire, and the other to the nozzle which had formerly held the glass pipe in the seltzogene; by fastening it with wire in the same manner I have a lever tap which I can move about over the plate as I like

As I have no doubt the heads of broken syphons are at times to be had for a trifle in most large towns I offer the hint.

A NEW DEPARTURE IN DARK SLIDES.

By G. V. J. Poirin.

The following description and diagram of a new form of dark slide will, perhaps, be of interest to those who have to expose several plates in the field. By means of this slide it is possible to expose six plates with only *two* changes or twelve plates with only *five* changes. A is a dark slide made thick enough to hold three or more pairs of plates back to back, each pair in a wooden or metal frame to suit the size of plate. B and C are two slots, just wide enough to admit of a pair of plates passing in or out. D is a bag of waterproof or other material impervious to light. E is a frame to which the bag is glued. It is arranged so as to slide in a groove in top of the dark slide after the plates have been inserted F is a pinching screw acting on the edge of the frame holding the plates to keep the front plate up to register.



To use the slide: Let us suppose that the two sides are marked Nos. 1 and 2; then, having exposed plates Nos. 1 and 2, you give the screw F a turn to release its hold on the frames, and, holding No. 1 side upwards shoot the two plates into the bag. Tilt the slide a little towards you, and you can then put the two plates which are in the bag through the other slot, and you have *two* fresh surfaces to expose. It is done in a moment, and in bright light is quite safe, especially if supplemented by the focussing-cloth being thrown over it. For cameras of small size more than a dozen plates can be worked in the slide. Of course a piece of black paper must be put between the backs of each pair of plates.

It will be necessary to work always *out* from No. 1 side of the slide and *into* No. 2, or a double exposure and strong adjectives will result. The frames must be numbered on each side thus—for a six-plate slide the frame nearest to No. 1 side will be Nos. 1 and 4, the middle frame Nos. 3 and 6, and the other one on Nos. 5 and 2.

Small plates need not go in frames, as they can be united together with postage-stamp margin or strips of carbon, of course with black paper between them.

◆

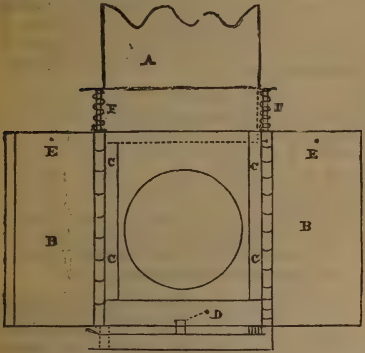
BANKS' SHUTTER.

By W. Banks.

This shutter is made of metal with the usual socket to fit on lens. Two small doors are hinged vertically, which, when closed, cover the lens opening. Each door covers half the space, and when exposure is made they are operated on by two spiral springs which open them as seen in the engraving. The moment these doors are open the drop shutter is liberated, and closes the aperture instantaneously.

The advantages claimed for this shutter are :—

Portability.—The one for a one and a-half inch lens only weighs three ounces and measures, when closed for packing, 2¾ inches by 1¾ inch by ½ an inch.



A, Drop shutter.
B, Small doors.
C, Grooves in which drop slides.
D, Catch to liberate doors.
E, Small pegs on which shutter rests previous to exposure.
F, Spiral springs which actuate side doors.

Rapidity.—The exposure commences in the centre, and only takes half the time of any other single flap. All the working parts are extremely light, consequently vibration is absent till after exposure. The speed of the drop can be regulated by another spring or the usual india-rubber band. The common pneumatic arrangement can also be applied for liberating the trigger.

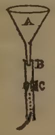
A SIMPLE EMULSION MIXER.

By R. P. Gregson.

Having had a difficulty in mixing emulsion at a standard speed, I have hit upon the annexed plan, which I hope may be useful to others in a similar difficulty.

By aid of this implement the silver solution may be arranged to run in a fine stream, or even drop by drop.

When the speed is regulated to about two drops per second the finest possible emulsion is obtained, no matter whether it be one simply of bromide of silver, or the more complicated mixture containing an iodide and a chloride.



A.—Glass funnel.
B.—Rubber tube.
C.—Baby's food regulator.

The funnel is suspended in a retort stand, the tube being placed in the neck of a Florence flask containing the bromised or bromo-iodised gelatine solution. The silver solution is poured into the funnel, and the flask is gently shaken as the silver solution trickles down the tube, a perfect mixture being the result. Thus, a baby's food regulator becomes an aid to "uniformity" in emulsion work.

HOW TO PRODUCE ENLARGED NEGATIVES.

By John Alfred Hodges.

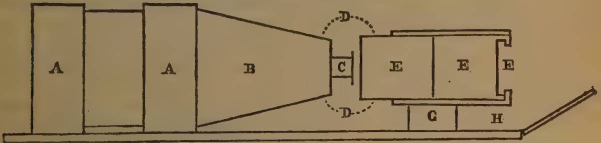
A desire to work a large-sized plate, or to produce enlarged negatives from their small ones, has, I suppose, been experienced by most amateurs. This is not to be wondered at, for hidden beauties imperceptible in the original come out in all their glory in a properly-executed enlargement. The belief that a simple description of an effective method of enlarging has been a long-felt want amongst amateurs has induced the writer to offer the following hints, the result of his own experiments, to the readers of the Almanac.

In the first place, the negative which is intended to be enlarged must, of necessity, be perfectly sharp, and have received a sufficient amount of exposure to allow all detail possible to be brought out under development. The use of a magnifying glass in focussing will be found of great assistance in securing sharp definition. Make a transparency by contact, and develope with ferrous oxalate; but recollect that if it does not possess vigour and richness of contrast you can hardly expect to find those qualities in your enlargement. Gelatino-bromide plates prepared with albumen have given me excellent results. I have used those prepared by Mr. J. T. Chapman, of Manchester.

Having prepared a suitable transparency we must now set about devising our enlarging apparatus. I may allude in passing to the use of the optical lantern as a means of producing enlargements. I have experimented with one in various ways, but have never been satisfied with the results—at anyrate, for landscape work. The definition of the enlarged image very perceptibly diminishes towards the margin, though, of course, for portrait work this would hardly matter. Diffused daylight will be found the best means of illumination and, in my opinion, the easiest to manage. Procure an old-fashioned box camera fitted with a dark slide large enough to hold the size of plate to which yo wish to enlarge. This must be capable of expanding to a considerable length—say three or four feet. I have removed the original base-board from the one I use, substituting a much longer one, and have connected the front and back portions of the camera by a bellows of my own construction. If the camera employed be considered too good to be tampered with in this way, the necessary length of focus may be obtained by having a long cone fixed to the front of the camera, to which the lens employed should be attached.

The best lens to use, and the one which gives the finest possible defining power, is a portable symmetrical of seven inches focus. It has one disadvantage, namely, the available aperture being very small it is extremely difficult to focus, owing to the small amount of light admitted. A very good substitute is any lens of the ordinary rapid type.

A portrait lens will not answer for enlarging a landscape negative, inasmuch as the marginal definition will be bad. Whatever form of lens be employed the stop intended to be used must be inserted before focussing, as, if it be inserted after, it may throw out the focus. Now have two wooden boxes made, each nine inches long—the one to work smoothly inside the other like a box camera. At the extremity of the larger box have a groove constructed in which to slide a frame made like the carrier of a magic lantern transparency, which is to hold the transparency to be enlarged. The whole arrangement can now be placed in front of a window—preferably in the upper part of the house—in order that no external object may intrude between the light and the lens. If such a situation cannot be found, a screen of white tissue paper or ground glass must be placed about a yard in front of the transparency. Any light which may penetrate between the lens and the box holding the transparency may be blocked out by means of a piece of velvet and some elastic. One thing to be remembered is that, although good work may be turned out with apparatus of the roughest and most primitive design, it is imperative that the transparency in front be kept absolutely parallel with the ground glass behind. The accompanying diagram will sufficiently explain any omission in description.



A A, large camera. B, cone. C, lens. D D, space to be made light-tight.
E E, sliding box. F, groove to hold transparency. G, support. H, mirror.

Having set up the apparatus as described, put the transparency to be enlarged upside down in the frame in front, and then determine by sliding in and drawing out the box the size of the enlargement. Use a magnifying glass and focus as sharp as possible; cover the transparency with a cloth, insert the dark slide, draw up the shutter, and expose by gently removing the cloth. Correct exposure can only be learnt by practice. It will of necessity vary according to the density of the transparency. On no account under-expose. If you do the resulting negative will be hard and granular. Use a slow plate by preference, and not much ammonia in development at first.

A cheaper method of obtaining an enlarged negative is to substitute Morgan's argentic-bromide paper for the dry plate. The resulting paper negative must, of course, be rendered translucent by waxing; but it is difficult to avoid the texture of the paper showing in the print, although admirable results may be obtained if the directions enclosed with the paper be carefully followed.

A wholesome dread of the "weeding out" pen of our Editor warns me to bring my contribution to a close, which I do, hoping that the suggestions here thrown out may prove of service to some of the readers of THE BRITISH JOURNAL PHOTOGRAPHIC ALMANAC.

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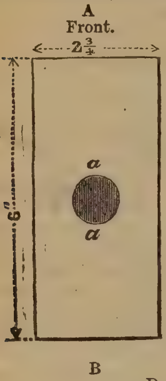
MY DROP SHUTTER AND HOW I MADE IT.

By WILLIAM OUIN,

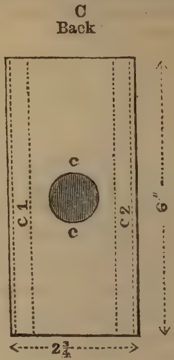
(Late Student at the Polytechnic, and Certificated by the City and Guilds of London Technical Institute.)

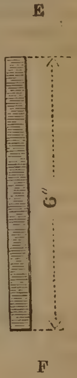
DURING the past season much has been said and written on instantaneous photography, and also as to the best form of shutter to obtain a really good picture. Now there is no doubt that at times it is not only desirable but imperative to take *instantaneous* pictures—that is, pictures in which moving objects may be depicted with sharpness and without blur. Many have studied the question, and the difficulties connected with it, with different results—some advocating the "snap," others the "drop" shutter. Of course, those who wish to learn *must* also read and *study;* and, if you do this, you certainly will not be satisfied in standing still. It is true we cannot be all in the front ranks, but we may *all* mutually help each other; and as I do not know of a better way of doing it than by recording our experience in the past, either in the JOURNAL or the ALMANAC, I venture (as my little contribution) to give a brief description, in detail, of my drop shutter—a cardboard model of which was exhibited at the Polytechnic Exhibition in June last.

Front.

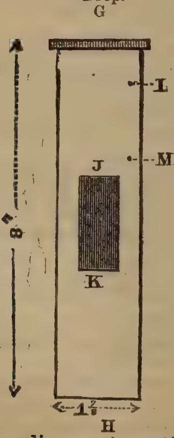


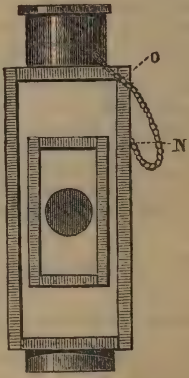
Back





Drop.





SHUTTER COMPLETE

Here is a diagram in sections of it:—Take two pieces of thin wood, or other suitable material, for front and back, each six inches by two and three-quarters A B, C D. Now cut two strips the width you want the front to be from the back, so as to allow the "drop" to fall through (about the eighth of an inch will do) E F. These strips glue or fasten on to the back piece C D, as shown in diagram marked C1, C2. In the centre of the front piece cut a round hole equal in diameter to the largest stop of your lens, *a a*. Next proceed to make a round hole in the centre of the back-piece, C D, of the same circumference as the hood of your lens, C C, and over this fix a little tube of wood, or metal, a trifle larger in circumference than the hood of the lens, so that the shutter may be fixed on it *firmly* whilst being used. For the *shutter* take a piece of ferrotype plate (or cardboard will do) eight inches long by one inch and seven-eighths in width, G H, so as to allow it *freely* to drop between the groove. Now cut a slit in it lengthways, J K, equal to about twice the diameter of the lens, and at the right hand corner—at the respective distances indicated in diagram—drill two small holes, L M. Fix the front and back together carefully so as to have it perfectly even, and then at N fix a very fine chain, two or three inches long, to which attach a steel pin, O. This is to hold the drop up whilst focussing, as represented, and for releasing same on exposure.

I have used this little shutter with some success, and although it is extremely simple I believe it embraces all that is necessary for taking ordinary instantaneous pictures.

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PLATE-CUTTING GAUGES AND TESTING SHUTTERS.

By Richard Parr.

The handiest gauges for cutting gelatine plates that I have ever seen I make of the thin wood used for covering the tops of the cases in which eggs are imported.

My diamond cuts exactly one-eighth of an inch from the straight-edge, and, therefore, to cut up whole-plates into quarters I make two gauges—one three and one-eighth and the other four and one-eighth inches wide—by planing up a piece of the wood long enough for the purpose, and glucing on a narrow strip of the same wood the required distance from the edge to form the stop. After the glue is dry I plane the strip down to a shade less in thickness than the plates to be cut, and glue a thin strip of card one-eighth of an inch wide on the under edges of the wood, where it comes in contact with the film. I find these a very great convenience, and use them for cutting all sizes down to about one and three-eighths of an inch square.

We hear a great deal about the action of drop and other shutters. May I suggest to those having an optical lantern to test their shutters on the screen? They will need no other assistance in deciding on the best for each purpose.

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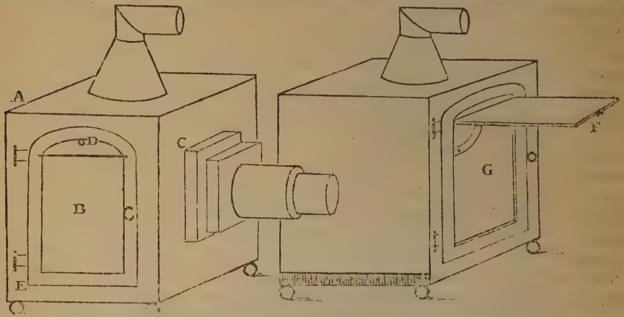
A COMBINED ENLARGING LANTERN, DEVELOPING LAMP, AND DRYING-BOX.

By W. B. Allison.

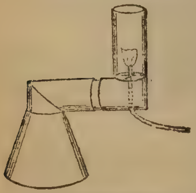
The subjoined sketches will give some idea of an instrument which, capable of being manufactured by any intelligent tinman, will serve the amateur for a variety of useful purposes. A is the lantern (constructed with the orthodox funnel, &c.), which, standing upon four knobs, admits a plentiful supply of air for ventilation through a slit three inches wide extending the whole length of the bottom. A plate of tin running across and half covering the bottom, at a height of two inches above the opening, prevents the escape of light, and serves as a stand for the lamp. This last is made with a triple wick, with reflector, and, sliding backwards and forwards in grooves at each side of the plate, is always centered behind the condensers.



A, Lantern. B, Slide door closed. C, Place for condensers. D, Knob for drawing up slide of door. E, Large lantern door on hinges. F, Slide up. G, Canary medium.

The condensers are screwed between two thin blocks of wood fitted together, and may be separated for cleaning or other purposes. Thus mounted they may also be easily lifted in and out of their position behind the lens. One side of the lantern, B, is formed by a door, flanged, and fitting light-tight. The door—a mere strong framework of tin—has a large opening which is covered with a piece of canary medium. This opening is in turn protected by a piece of tin forming a shutter sliding in grooves, and hinged at the bottom like the shutter of a dark slide, so that when drawn up it may be folded over—being prevented by a stay from falling quite over—and reflects down to the developing dish all the light emitted from the window.

A spare top containing a small gas jet, such as is used with many of the drying cupboards already described in previous ALMANACS, is made capable of being affixed to the lantern chimney, so that the machine may be used either as an enlarging lantern, a dark-room lamp in a cupboard for drying small pieces of carbon tissue or a few gelatine plates racked in a suitable frame, which the door made purposely large will admit.



Top of lantern with gas jet, &c., attached, to create draught for drying purposes.

A small opening about an inch and a-half in diameter on the opposite side of the lantern, and covered with a slide, allows the lamp to be watched, and is also useful for making small vignette transparencies. My own lantern is made 20 × 18 × 12; but, of course, any dimensions may be taken to suit individual taste.

DEVELOPING DISHES.

By WILLIAM STOKES.

ALTHOUGH much has been written in the JOURNAL and in the ALMANAC of preceding years about developing dishes, and very excellent instructions have been given by the Editors and others for their manufacture—in paper and other materials—yet I think the subject is not quite exhausted.

That it is a great boon for the photographer, whether professional or amateur, when he is far from home with his camera and dry plates, to be able to develope a few plates occasionally "goes without saying;" but to take the ordinary developing dishes with him—whether they are made of tin, ebonite, or other material such as is generally used for this purpose—adds to the bulk, if not much to the weight, of his burthen, and it is desirable to reduce the bulk as much as possible, especially when it can be done without impairing the efficiency of his apparatus.

The following very simple and inexpensive method of making, developing, fixing, and aluming dishes I have employed for some time, and have found them to answer so well that I very frequently use them at home, although I have a double set of tin dishes, besides wooden ones lined with paraffine, &c.

Procure a piece of brown paper—as free from holes as possible—for every dish you want. Cut it two and a-quarter inches longer and two and one-eighth inches wider than the negative you wish to manipulate; turn the edges up all round at a distance of about seven-eighths inch from the margin, bend them down on the paper, and crease them. Then turn each edge back again at the crease, and put it to stand at right angles to the paper, and you will have a dish; but the four corners will not be right. Now take one of these corners and pinch it so that the side and end of the dish come in contact when both are at right angles to the bottom. Then turn the corner and make it lie by the end, put a little metal clip *on it and the end*, so as to hold them both together, and do the same to all the other corners in succession. After this take the four clips off, lay the paper flat again, take a lead pencil, write a large P for pyro. on one, H for hypo. on another, and A for alum on another, and then get some paraffine wax and a hot iron and wax them. When they are cold turn up the sides and ends, turn the corners to the ends, put on the clips, and they are ready for use.

The clips are made thus:—For each one take a piece of zinc or tin (say) one and a-half inch by three-eighths inch, double it in the middle so that it will be $\frac{6}{8} \times \frac{3}{8}$ inch, and hammer it flat with a hammer; four such clips are wanted for each dish.

When using them it is better to put the dish on a piece of board or slate or some flat surface, otherwise the developer is apt to get under the plate; but this is not indispensably necessary, for I have developed plates of 7½ × 5 in them without such surface, by simply holding the dish on my hand.

I only know of one inconvenience attending the use of these dishes, and that is, if they are made too small or too near the size of the plate, the plate is apt to catch against the bottom of the clips when you get it out. If it do, make the dish a little larger; but the smaller the dish is the smaller the quantity of solution necessary. When you go on tramp you simply pull the clips off and put them in your pocket, and the paper goes flat again; thus you have nothing but two or three flat pieces of paper to carry.

If I were at any time so situated that I could not get wax to wax my paper with, I should not hesitate to get a piece of well-glazed news or other paper and make a dish of it (perhaps I should take two thicknesses of it). Such paper will hold water for a long time when care is exercised; there is but little friction, and when I had done with it, or if it got ruptured, I should throw it away and make another. Such dishes are very useful at times, and are very little bulk, weight, or expense.

I have written this with the desire of calling the attention of photographers to the usefulness of such simple materials, rather than with the expectation of providing them with some new idea.

AN OXYGEN GENERATOR.

By Thomas Gulliver.

Gas bags are rather troublesome, very expensive, and looked upon as a source of danger. Lately, owing to certain reports of explosions, &c., I had made for me a gas holder which has fulfilled my expectation of it so far, and, as it has some few novel points in which it differs from others, perhaps it may be worth space for a description of it.

It is made of large sheets of strong tin, so that there is less need of many joints. It is merely a deep box 22 × 14 × 10 inches, with one brass socket on each side of the gasholder and one on each side of the receiver. Two brass rods fit into the lower socket, and the other two on the gas-holder fit easily on the two brass rods. These serve as guides, and are crossed at top by another rod with screws at each end. I have three retorts about four and a-half inches diameter at the bottom and six inches high, made of sheet iron. These take four ounces each of oxygen mixture, and two of them are quite sufficient to fill the gasholder, and are then washed out, dried, and recharged. This will make quite enough gas to last an hour and a-half, but I like to have a spare retort in case of wanting a little extra. The gas requires five minutes over a gas stove or spirit lamp before it comes off; then about five minutes more to exhaust the charge. There is no necessity to wait, for when the holder comes down to about three inches I make a fresh allowance. Fourteen pounds weight on the holder is the utmost that is required, and less for the spirit jet.

Thirteen ounces of chlorate of potash kept up the light fully for one hour and forty-eight minutes. The holder is not heavy or cumbersome, and there seems to be far less waste than with bags. There is no need for making up the oxygen mixture into cakes with water, the loose powder answering every purpose. It requires about four small buckets of water to fill the receiver; that and emptying the same is less trouble often than the bother of getting weight and finding a suitable place to make the gas. There is no risk of explosion, and not requiring much floor room I expect to find it more satisfactory than gas bags.

BOOK FOR DRY PLATES.

By A Tourist.

A subject of great importance, both to amateurs and professional photographers, is that of packing dry plates, especially when travelling. All tourists must have experienced the very great difficulty (I might almost say "impossibility") of neatly and effectually reinserting the loose pieces of paper or grooving between the plates in the cardboard boxes as sent out by the manufacturers, more particularly as the feat has oftimes to be performed in hotels at an improvised table in one's bedroom by the faint glimmer of the small ruby lamp used for changing plates. That this involves great waste of time and temper I know to my cost. I have tried all sorts of wooden and other plate-boxes, but they are too heavy and bulky for travelling.

When preparing for my last summer's tour I set about inquiring for some improved means of carrying the plates. Not being able to come to London and look for myself I sent to the principal photographic dealers for catalogues, and in that of Messrs, Sands and Hunter, of Cranbourn-street, I recognised the article I was seeking, which was at once light, portable, and of moderate cost. They call it the "photographic plate book." It is constructed like a book containing a dozen sheets of specially-prepared paper with a space between each leaf, where the plates may be laid with the greatest facility, even in the dark. This book is enclosed in two outer light-tight cardboard cases. I have kept plates in these books for several weeks, and they have not been injured in the slightest by friction or in any other way. Having found this book so thoroughly satisfactory, I can confidently recommend them to all tourists.

[A similar "book"—in which, however, the plates rested in recesses in the several leaves—was in the market some years ago. The one referred to above is less bulky, and, at the same time, cheaper; but the idea is not new.—Editor.]

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COLLODIO-CHLORIDE PRINTS.

By Capt. Abney, R.E., F.R.S.

The recent exhibition of the Photographic Society of Great Britain was sadly deficient in collodio-chloride prints, and it is a pity that it should be so, as nothing gives such exquisite quality as collodio-chloride, and, I may say, greater permanency. It had been my intention to print my negatives by this process for exhibition purposes, but my late return home prevented my doing so, as I have not prepared my paper. However, another year I hope I may be more fortunate.

The reason of my writing these remarks is to show that I have faith in this process, and I will state why. In the year 1868 I took a lively interest in the process, and in the subsequent year I printed all my negatives by it. They were toned principally with the lime bath, and the film was supported on enamelled paper. The ordinary fixing bath was used. The prints so toned have a beautiful dark brown tone, approaching black, and some have been exposed to sunlight and gaslight ever since that period; others are mounted in a scrap-book, and others are loose in a portfolio. Yet out of the lot *not one* has altered in colour or in purity of the whites; in other words, they have not faded in the slightest degree. This is what I should have expected theoretically; for there is nothing to fade, or, rather, I should say, to cause fading. The organic salt of silver which has been altered by light is not a complex body, such as albumen, but a body with a very definite composition, since it was the citrate of silver which was employed. On fixing, the part not reduced by light dissolved out freely, and there is nothing to hold it back in the film, since it is collodion, which is essentially porous. If there were a demand for it, collodio-chloride paper would soon be supplied by dealers in such articles; but it is not a very hard task—in fact, I might say it is an easy task—to prepare it oneself, as I do my own.

In the process as just described there was always need to use an excess of free silver nitrate, as I have described it. At various times such excess is unnecessary; hence the difficulty of the crystallisation of the salts, being only slightly soluble in alcohol, is avoided. I would recommend your readers, especially amateurs, to give it a trial, when I doubt not they will readily adopt it for special work. For ordinary commercial work the expense might prove to be an obstacle to its introduction, though, if the product be superior, a higher price would be got for such a commodity. I may say that I have headed this article "Collodio-Chloride," since it popularly goes by the name. In my own writings I call it "collodio-citro-chloride," which is a more accurate definition of it.

NOTE ON THE SULPHO-PYROGALLIC DEVELOPER.

By E. Audra (Paris).

Although I may be a partisan of the ferrous oxalate developer for gelatine plates, I do not refuse to recognise that in certain cases pyrogallic acid development is superior to it; and, while carefully avoiding to attempt to give a new formula, I hope to render service to some of the readers of the Almanac by indicating in what manner I utilise this product with complete success.

My method—which, perhaps, is not new, but which I guarantee to be excellent—consists in preparing a concentrated stock solution of pyrogallic acid, which appears to keep indefinitely. It is thus prepared:—

I take 90 parts of a twenty-five-per-cent. solution of sulphite of soda of good quality, in distilled water, and add to it ten parts of water acidulated with ten per cent. of sulphuric acid, and shake well. This liberates sulphurous acid, which makes its odour freely felt. Then I finish by the addition of ten parts of pyrogallic acid. I have thus a solution containing exactly one part of pyrogallic acid in ten, from which can be measured the requisite quantity for the development of a plate, either with ammonia or any other alkali. Thanks to the presence of the sulphurous acid the liquid preserves a perfect clearness, and does not colour brown until after some months. I have some more than a year old which works as well as at first.

The development proceeds rapidly and gives excellent results if suitable proportions of alkali and of bromide have been employed—proportions which may be considerably varied according to the result it is desired to obtain.

The yellow colouration of the negative is very slight if the development have not been too prolonged, owing to the presence of the sulphite and traces of sulphurous acid in the developer. But should the colour be too intense nothing is easier than to remove it entirely by immersing the negative, still wet, or even after drying, in a tolerably concentrated solution of ordinary alum and citric acid in water. Ten parts of alum and five of citric acid to one hundred of water will answer well. I possess numerous negatives so treated which it is almost impossible to distinguish from other negatives developed with ferrous oxalate.

I can particularly recommend, not this formula—for it is not one—but this method of using and preserving pyrogallic acid. I am convinced that those who will only give it a trial will not be long in renouncing the preparation of a stock solution of pyrogallic acid in alcohol; and I shall congratulate myself upon having—even in a very small measure—aided in the simplification of a useful method of development.

◆

PRESERVED SENSITISED PAPER.

By W. K. Burton.

The method used in the manufacture of the best preserved sensitised papers—papers which will retain their purity of colour for many months, and will, in the hands of those who know how to use them, give results which leave but little to be desired—has remained, so far as I can ascertain, a secret in the hands of the manufacturers.

Various formulæ have been published from time to time for treating sensitised paper so that it will keep; but paper treated by these does not—in my hands at least—give the same results as do certain papers in the market. It appears to fall short always in one or other of the points of excellence which the best commercial papers exhibit. These points of excellence may, I think, be said to be the following:—The property of keeping for a long time without discolouration, the property of printing rapidly, and the property of giving brilliant prints.

Now, although all these good qualities may not be united in paper treated by any of the formulæ which have been published, it does not follow that we may not get a very servicable paper by them, because two of the points mentioned are not of material importance. Thus, for example, a paper which will keep for two or three weeks will serve the purposes of most quite as well as one that will keep for two or three months. Nor is it essential that the paper should print very rapidly, the gain to be had in that direction being at the best but trivial.

I find that the method of sensitising in the ordinary way, then treating with citric acid on the back, gives an excellent paper which will keep for several weeks. Paper prepared by this method gives as brilliant a print as any I have used, prints rapidly, and will give better purple tones than most preserved papers. I am sorry I cannot recollect the name of the first publisher of the process, so that I might credit it to him.

The method of procedure is as follows:—Paper is sensitised in the usual manner. It is then floated *on the back* on a fairly strong solution of citric acid. The precise strength does not matter, but thirty grains to the ounce will do very well. Before the second floating the paper must be allowed to become surface dry, or great difficulty will be found in preventing the citric acid solution from getting on to the face of the paper. If it do, toning will be found impossible. I prefer myself to apply the citric acid solution not by floating at all, but by the help of a brush. The brush which is used for damping a copying letter book will be found excellent for the purpose. The paper in this case, too, should be allowed to become surface dry. It is then laid face downwards on a clean piece of filtering paper or blotting-paper free from hypo., and the citric acid solution is brushed over the back.

I next come to Captain Abney's process. This consists in sensitising in the usual manner, removing the free nitrate of silver by washing it out of the paper and replacing it by nitrite of potassium as a sensitiser. I had considerable difficulty in getting brilliant results from paper so treated at first, but have since succeeded very well. My first failures were, I believe, due to insufficiently long floating on the sensitising bath. It must be borne in mind that in the ordinary sensitising process a film of silver nitrate solution remains in contact with the albumen surface after the paper has been removed from the bath, and that, indeed, through evaporation the solution continues to become more and more concentrated; thus the sensitising action continues after the paper has been hung up to dry. When, however, we float paper on a water bath after sensitising to wash away the free silver nitrate, the action is, of course, at once stopped. To compensate for this abrupt stoppage of the sensitising action, then, it appears necessary to give a longer time for floating, and advisable to have the bath somewhat stronger than it would otherwise be. I found that I got excellent results when I increased the strength of the bath by ten grains per ounce above that recommended by the maker, and gave one to two minutes extra time of floating. Using the chromate of potash indicator which I described some time ago at the London and Provincial Photographic Society, I find it advisable to allow the colour of the chromate spot to turn deep orange before removing the paper from the bath.

Briefly, this excellent process, as I have lately worked it, is as follows:—Paper is floated on a bath ten grains to the ounce stronger than is recommended by the makers of the paper, and is floated for from four to five minutes. It is then floated for twenty to thirty seconds on each of several baths of water; and, lastly, is floated on a solution of potassium nitrite. The floatings are all performed with the albumenised surface downwards. The strength of the nitrite bath may be varied greatly without much harming the results. I have been using twenty grains to the ounce. The paper thus made does not print so quickly as some preserved papers, but keeps well and gives excellent prints.

Albumenised papers vary greatly in their capabilities of giving good preserved papers; but I am sorry to say that I can find no means of discovering which are the fittest except that of experience.

◆

AN ADVENTURE WITH COLLODIO-ALBUMEN.

By Ellerslie Wallace, Jun. (Philadelphia).

In the course of some experiments made on the old Taupenôt albumen plates for lantern slides, I fell upon a most curious and disagreeable thing, which, however, like most failures in the chemical manipulations of photography, carried a wholesome lesson with it.

I had been using the above-mentioned process with entire success for a time, when suddenly the plates on development showed hundreds of black comets—not superficial, but deep down in the film. They were evidently reduced silver, and were either round dots with short tails or a mere speck from which started an immense splash, as it were, sometimes nearly an inch in length. No care in filtering solutions or in shielding the plate from dust while drying had the slightest effect. New albumen and new everything were made up in vain.

Thus the matter went on for several months with unremitting experiments to find where the trouble lay. At last, after great loss of time and material, it suddenly occurred to me that the spots had made their appearance about the time of the first breaking up of the ice in the early spring. On comparing notes with some of my friends who had been old tannin workers in past years, I began to suspect the tap water. Certain troubles in the otherwise very reliable tannin process had been clearly traced to impure washing water—so they told me—and, to my great satisfaction, when I substituted filtered or distilled water for the ordinary the trouble disappeared. I have no doubt that the thaw set free quantities of inorganic iron or sulphur compounds, or both, which find their way into the upper Schuylkill valley from the numerous coal mines in that vicinity. This would at once explain the fact of the spots not appearing during the time that the river was frozen during mid-winter.

To those who still use this most excellent process for lantern slides (Taupenôt), I should recommend that nothing but distilled water be used for the first washes of the plate, or so long as any appreciable amount of silver is present. The organic compound of albumen and silver is exceedingly susceptible to any impurity or rough handling while wet. When dry, however, especially if protected by gallic acid, it becomes far more stable.

I will only say, in conclusion, that I have yet to see any results (in the form of lantern slides) on gelatine, no matter how made, that would lead me to abandon albumen and collodion. Ease of manipulation and unsurpassed quality of result are characteristics of the collodio-albumen process.

TONING.

By Thomas H. Kane (Brooklyn).

The tones of a photograph depend upon the character of the negative, the conditions of the printing, toning, and fixing solutions, the depth to which the photograph has been printed, the character of the skylight under which, and the quality of the light by which, the negative was made.

A good negative—one in which the proper degree of metallic reduction has been effected—is the first desideratum for the production of fine tones. The production of such a negative requires a properly-constructed skylight and a good quality of light. If the quality of light be defective the negative will not be satisfactory, and, on the other hand, though the light be good, if the skylight be improperly constructed (too high, for instance) the illumination of the draperies will be unsatisfactory, lacking density in the high lights and depth and clearness of the shadows. Prints from such a negative will be flat and deficient in contrast, and cannot be printed or toned as satisfactorily as could be done with those from a negative made under more favourable conditions of lighting. There will not be that rich brilliancy arising from contrast of good, strong high light with deep, clear shadow. It may be here observed that these qualities are also affected by the character of the lenses used. Lenses of clear glass, large aperture, and properly constructed are desirable. In addition to these points it should also be noted that the collodion, developer, &c., used in making the negative should work harmoniously with the light, and be so compounded as to produce the desired chemical effect in the negative.

A plain solution of silver in pure water (fifty to sixty grains per fluid ounce), made faintly acid with C. P. nitric acid, gives satisfactory results. Hardwich does not recommend the nitrate of ammonia bath. An alkaline bath dissolves the albumen from the paper, and the tones have a tendency to change in burnishing. The printing bath should be kept in good order. When it begins to deteriorate the tones will be unsatisfactory, and the prints may even refuse to tone at all if the bath be very much impregnated with albumen. When the bath commences to be odorous, and deposits a film or sediment on the sides of the filtering funnel, neutralise it, boil to dryness, add fresh water, and silver to the strength of fifty to sixty grains per fluid ounce; sun well, filter clear, acidify faintly with C. P. nitric acid, and use. A printing bath for general use should not be less than fifty—and better still, sixty—grains of silver to every fluid ounce. A bath of such strength coagulates the albumen on the paper, and produces softer, more brilliant, and velvety prints than a weaker bath can do. Thin negatives or defective lighting may sometimes render the use of a weaker bath advisable. The use of alum in a printing bath does not appear to be necessary. When prints from an alum silver bath are washed in hard water they are likely to be coated with a white deposit that delays or prevents toning.

The tone of a photograph is also affected by the depth to which printing has been carried. The deeper the printing (when properly and intelligently executed) the finer and darker the tones of the resulting print. Any good formula for a toning bath, if intelligently used, ought to give good results. The addition of excessive quantities of alkalies to toning solutions is theoretically wrong and practically uncalled for. Hardwich says that only a sufficient quantity of alkali to start decomposition of the metallic salts and prevent acidity is needed. Practically this has been proved to be correct. Slow toning action, and sometimes a refusal of the bath to tone at all, result from excessive alkalinity, and also when the toning bath is too cold.

Some photographers, with a predilection for blue-black tones, labour under the delusion that those tones can be secured on any print. It is an erroneous idea. It has been said that "a good, clear, pretty blue is a little hard to obtain unless the negatives are fine and possess good toning qualities" (Vogel?). There is a certain point at which toning should be stopped if the beauty and brilliancy of the print is to be preserved; and, though toning may be forced beyond this point, it will be at the expense of beauty and brilliancy. A close inspection of the print will reveal a sacrifice of these properties, and an over-toned and more or less flat photograph will be the result. It is well to emphasise this point; for, strange as perhaps it may appear, there are many photographers who do not really know when a print is toned. ("It is perhaps a little difficult to determine when toning should cease"—Vogel?) There are others, and very able ones too, who do not know how a photographic skylight should be constructed. "How few of us know why we are doing what we are doing!" was the remark of a very able photographic printer. Said he—"We do a certain thing in a certain way, because we were taught to so do it, without stopping to inquire the right or wrong, or the why and wherefore of it," and he was correct in his assertion.

The formula for a toning bath is not of so much importance as the proper manipulation of it. Photographers, however, have predilections for favourite baths. The acetate of soda bath is very popular and gives a variety of fine tones. When new a difficulty is sometimes experienced in working it; but this is readily overcome by the addition of a little bicarbonate of soda with the acetate. This bath may be used repeatedly, and when from time to time it becomes impoverished and deteriorated reject a portion of it, add water (and gold as needed), when the bath will be found to work as well as before. A little tungstate of soda used in connection with the acetate produces some pleasing variations of tone. The carbonate and bicarbonate of soda baths are both good ones. A bath strong in gold will give darker tones than one weaker in gold would do. The toning bath should not be cold while in use.

The fixing bath should be warm, but not too hot—at least one to eight or six strong—and the prints should be kept moving in it. If they are permitted to remain motionless and in contact with each other it will require more time to fix them.

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REMOVING DEVELOPER STAINS.

By Cecil V. Shadbolt.

Having frequently been troubled with stained fingers resulting from the use of the alkaline developer, the idea occurred to me some time since that by rinsing them in the ordinary alum clearing bath the result might possibly prove as efficacious a remedy as is the case with gelatine films. The experiment was immediately tried, with a most successful result; and I now repeat the remedy for the benefit of any to whom it may not have occurred, though I cannot but suppose it is probably well known to many.

◆

A NEW PRINTING-PAPER PROCESS.

By J. A. Forrest.

It is well known to old photographers that, amidst the innumerable processes which have appeared since the daguerreotype, none have approached in detail and half-tone the albumenised stereo. pictures of MM. Ferrier and Soulier, of Paris, and the late Mr. Breeze, of Birmingham. The fashion of art has made these beautiful pictures obsolete, and to the present generation unknown. Many of our so-called inventions are but old friends brought forward with new and more attractive dresses. To mould our old friend to the times, we require a paper coated with "whey," and afterwards surfaced with sensitised albumen, which would be printed in the ordinary way by superposition. This would naturally separate itself when under the process of hypo., and may be easily transferred to glass for lantern purposes or to carbon transfer paper. Such a paper might be easily prepared by any of the enterprising firms that manufacture gelatine papers. In this way the amateur would get finer results than he now secures by the operose style of what is commonly called "sun-printing." I possess a number of pictures so produced, and would follow it up if I could only induce some manufacturing firm to make the paper in the manner described.

The present age is teeming with art productions, and very clever amateurs are appearing dexterous in manipulation; but the tendency is *quantity*, without sufficient study of the object taken. We very frequently meet eight or ten gentlemen rushing by a cheap trip train with their cameras, and of course their photo. legs, to take miles of picturesque scenery, get lunch at some roadside inn, and bolt to the station to get home in the evening. The first thing they ask each other is: "Well, Tom, how many pictures have you taken?" Tom replies twenty or thirty. "Ah, but I beat you, for I have taken fifty." Stop, my young friend; that system will never make you an art photographer, and will only give you hundreds of negatives not worth printing. Take the advice of an old amateur photographer—devote a day in search of real pictures, and select the time of the day. "Old Sol" will artistically light them. Then go some other day of a propitious kind, taking care to shade your lens from extraneous rays; and if your day's work yields you two really good pictures your pleasure will be lasting, and the result will be worthy of enlargement, besides a source of admiration to your friends.

There are other classes of pictures not always artistic, but chiefly valued for their association. They generally consist of "wee things," or they may be your *confreres* in your lifewalk. Take them, for they yield afterwards invaluable histories of those friends who have linked their heart-strings with everything near and dear to you. Time will make them priceless.

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THE SODA DEVELOPER, AND ONE OR TWO OTHER THINGS.

By the Rev. Locke Macdona, B.A. (Oxon.)

I think the advent of the new year will see many converts to the soda developer. I use it now almost on all occasions, and the more I use it the better I like it. I have only tried one formula whose ingredients are soda, sodic sulphite, and sulphurous acid, but *no bromide;* and what surprises me is the wonderfully-sparkling shadows it gives, which, together with a fine gradation of tone and absence of all hardness, make it a very valuable developer. I am not done with it yet, for I find another of its virtues to consist in its taking most kindly to the mercury intensifier. I get a rich chocolate image without clogged shadows, mottling, or staining, whilst I seldom get anything fit to look at when I try the mercury on an ammonia-developed negative.

I find the best result is obtained by always giving the full exposure, as it is more difficult to bring out detail in an under-exposed plate with soda than with ammonia. In over-exposure an excellent suggestion appeared not long ago in the Journal, namely, to instantly dilute the developer to half its strength. This plan, aided by citric acid in extreme cases, ought to save every over-exposed plate. The economical properties of this developer, too, should not be lost sight of; it may be used for several plates in succession, as many who have used it have testified.

Having done with the soda developer I would like to mention a little implement I find very useful when toning and fixing. It is a wooden salad fork. It makes a capital "paddle" to eliminate the free nitrate, and nothing could be more convenient for turning the prints over by slipping them between the prongs. I always tore my corners with the usual clip, but I never do so now. I have tried all kinds of lamps for the dark room, and find no lamp in existence can at all compare with Chapman's hock-bottle lamp. It gives a glorious light, does not smoke, get hot, or crack, and is *absolutely safe.*

Lastly: I would like to urge all who contemplate getting new cameras to procure that model which has a *fixed* back and a *moving* front, as the convenience in focussing is immense.

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HOW TO REMOVE SILVER MARKS FROM THE GELATINE FILM.

By W. Hanson.

It may not be true to say that successful practice is made up of little "dodges," but it is quite certain that little "dodges" contribute to success; therefore anything, however small, which has been proved to be useful is worth publishing.

Having proved the utility of the following "dodge" I do not hesitate to recommend it to others :—

Sometimes it happens that an unvarnished gelatine negative will get marked or stained through being placed in contact with damp silver paper in the printing-frame, or (what comes to the same thing) from the pad of the frame not being quite dry. When the surface marks thus caused do occur they can easily be removed by a brisk rub with a wash-leather (or other suitable material) stretched tightly over the end of the finger and moistened with spirits of turpentine.

By this simple means even green fog can be rubbed away.

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CARBONATE OF SODA IN THE DEVELOPMENT OF GELATINE PLATES.

By Edward Dunmore.

For some time past I have entirely discarded the use of ammonia in the development of gelatine plates in favour of carbonate of soda, which the more I use the better I like it. Looking upon a negative only as a means to an end, the kind of development that will make the best printing image is *the* developer to select.

Carbonate of soda (the pure quality) is an inexpensive chemical, and may be kept in solution without deterioration. A convenient strength is four ounces in a pint of water. One part of this, when mixed *just before use* with three parts of a solution containing one grain of pyrogallic acid and one grain of bromide of potassium to the ounce of water, will be found to produce an image of excellent quality.

There is great latitude in the use of the soda. The proportion of soda may be increased in the development of negatives with great contrast several times, without risk of fog. The image in all cases comes up slowly, and the density is always sufficient. In the case of too much density the bromide of potassium may be reduced in quantity. Without any bromide there is generally want of pluck, whether the alkali used be soda or potash.

In my experience I cannot see any advantage in the use of potash salt over soda, or any advantage in mixing them.

After development, and before fixing, the negative should be placed a few minutes in a solution of chrome alum and citric acid.

ABOUT GRAINS AND DRAMS.

By William Coles.

"Sixteen drams one ounce, sixteen ounces one pound." So we learn in our table-books at school; but how many of us have ever seen the dram corresponding to the one-sixteenth part of an ounce? Then we learn sixty grains one dram, eight drams one ounce, twelve ounces one pound; also sixty minims one fluid dram, eight fluid drams one ounce, twenty ounces one pint. But we find that one dram by weight is not the same as a dram by measure, and it likewise appears strange that such an odd number of grains as 437½ should have been adopted for the standard ounce, while 480 (a much easier number to calculate with) make up the ounce we do not use. The fluid ounce, too, is divided into 480 minims, thus making a minim and a grain differ in value.

Perhaps it may interest some of your readers to roughly sketch the history of our English weights, showing how the muddle has arisen; and if it should then appear that the metric system is less complicated something will have been done towards hastening the advent of the inevitable change in our weights which will one day take place.

Though many photographers get along very well with only the barest knowledge of weighing and measuring, yet I hold that artistic culture is not incompatible with technical manipulative ability, and that, other things being equal, he who has most control over the tools he works with is best able to give effect to whatever artistic ideas he may have.

English weights are derived mainly from three sources, the oldest being the *avoirdupois*, next the *tower*, and lastly the *troy*. The auncel or stilliard weight was introduced by the Romans, and though kept up chiefly by the stilliard or beam, with a pan at one end and movable weight at the other, has descended to us so accurately that twelve ounces avoirdupois (equal to the small pound of the Romans) weighs only eleven grains more than the twelve-ounce pound standard still, or until recently, kept at Rome.

In the time of Edward III. it was enacted that all manner of "averdepois" should be weighed by even balance, and not by stilliard. Henry VIII. ordered all butchers to provide themselves with beams, scales, and weights called "haberdepois;" and Queen Elizabeth caused avoirdupois weights to be made from those preserved by the Founders' Company, and proclaimed them standards.

The weights of this system formerly in use in England were as follow, the equivalent in troy grains (the only kind now extant) being also given :—

Avoirdupois.						Grs. Troy.
1 gr. Eng.						·76
24 ,,	1 scr. Eng.					18·22
36 ,,	1½ ,,	1 adarme of silk				27·34
72 ,,	3 ,,	2 ,,	1 dr.			54·69
576 ,,	24 ,,	16 ,,	8 ,,	1 oz.		437·50
6912 ,,	288 ,,	192 ,,	96 ,,	12 ,,	1 small lb.	5,250·00
9216 ,,	384 ,,	256 ,,	128 ,,	16 ,,	1 lb.	7,000·00

The avoirdupois grain and all the other weights except the ounce and pound (of sixteen ounces) have gone out of use, so that it now stands—

1 troy grain.
437½ troy grains 1 avoirdupois ounce.
7,000 ,, 16 ,, ounces 1 avoirdupois pound.

These are the weights by which chemicals and all articles, except precious metals and jewels, are bought and sold.

The Saxons introduced a system known as "tower" weight into the mint, and it was apparently also used by the Custom House. Its grain had a different value from the avoirdupois, and nearly equalled the troy grain. In its later form this system was as follows :—

				Troy Grs.
1 "tower" grain				·94
24 "tower" grains	1 penny			22·50
480 ,,	20 pennies	1 ora or ounce		450·00
5760 ,,	240 ,,	12 oras or ounces	1 small pound	5,400 00
7200 ,,	300 ,,	15 ,,	1 larger "tower" pound	6,750·00

The Roman government allowed merchants on account of waste twenty ounces to the pound, which was afterwards reduced to eighteen ounces, so that 100 pounds really equalled 112½ pounds, the half-pound being in time disregarded—and this we still call a hundredweight.

Some articles of commerce when brought into the London market have had an allowance of four pounds taken off every 104 pounds, this remittance being called "trett." Now 104 "tower" pounds of fifteen ounces equalled 100 avoirdupois pounds of sixteen ounces. It would therefore seem that, when this was first allowed, the customs authorities employed the tower weight and took off the four pounds to convert it into avoirdupois used in general trade, the allowance being kept up when the difference in weights no longer existed, but restricted to articles having waste.

Troy weight (so called from Troyes, in France) was brought over by the Normans, and was introduced by them into the mint. There have been attempts at various times to make this the system for general use, but public usage has been too strong. All that has been done by legislation, extending over a period of 600 years, is to make the troy grain the standard to which all other weights are referred. The weights now in use are—

1 grain troy.
60 grains troy 1 dram.
480 ,, 8 drams 1 ounce.
5760 ,, 96 ,, 12 ounces 1 pound.

Formerly a pound of silver was equal to £1 in value, and was divided into twenty shillings, and each shilling into twelve pennies (pennyweight), the shilling being then more frequently used than the ounce; but when the value of silver coins was altered the shilling as a weight fell into disuse.

One of the provisions of Magna Charta was, I believe, that there should be only one weight, one measure, and one quarter of corn throughout the country.

Henry III. tried to change the common weight into troy, calling it "weight of assize;" and again in Henry VII.'s time it was decreed that assize weight should be called troy. It would have been better had troy never usurped the place of avoirdupois. The reason it came to do so in the matter of grains and drams is this:—The gold and silversmiths, owing to the use of the troy grain in the mint, were obliged to use troy weights, and the only other people who required to use small weights were the apothecaries—the predecessors of the modern pharmacist. Since these were not subjected to the same check as other tradesmen in being liable to have their goods re-weighed by their customers, they took up with the small weights found in the scale-makers' shops used for weighing coin, and thus the old English drams, scruples, and grains of the avoirdupois system went out of use altogether. What helped to hasten this, was that in the beginning of the seventeenth century, the doctors published their first pharmacopœia, which was compiled by a French physician, who, not being conversant with English usage, ordered the apothecaries to dispense their more or less useful, but often nauseous compounds, by troy weight instead of avoirdupois. It was proposed some time after to return to the old weights, but unfortunately this suggestion was not adopted.

There were, however, never more than eight drams in the avoirdupois ounce; but, according to an authority on the subject, who wrote about sixty years ago, the *adarme* ($\frac{1}{16}$-ounce) used for weighing silk got confounded with the *dram* ($\frac{1}{8}$-ounce), and in treatises on arithmetic the ounce avoirdupois was divided into sixteen drams, the English grains and scruples being omitted. This error is perpetuated to the present day.

The unit for measure is an avoirdupois ounce of water, twenty of which go to the imperial pint. Its subdivisions into eight drams and 480 minims cause the minim to weigh less than the grain.

In America the troy grain is also used, but the fluid ounce, though like ours divided into 480 minims, contains only 450 grains, midway between avoirdupois and troy, while the pint consists of sixteen fluid ounces—not, as in England, of twenty. It will be well, therefore, to bear in mind the difference beween the two respective pints, as photographic formulæ are frequently exchanged between the two countries. By-and-by we may expect to use the gram and cubic centimetre like our continental neighbours. It would much facilitate the interchange of formulæ between English, French, and

German photographers if the quantities were expressed in parts instead of ounces, drams, and grains, and where absolute accuracy was not required this plan might well be adopted. It must be noticed that where great exactness is necessary a little error would creep in when solids have to be dissolved in liquids. To a Frenchman or German—ammonia one, water nine, or pyro. one, water up to ten, would mean one cubic centimetre of ammonia, or one gram of pyro. in every ten cubic centimeters, and as long as we are dealing with ounces it would mean to an Englishman or American one ounce in ten ounces. If, however, the solution is to be used in small quantities, how we should understand it would be one grain in ten minims, which, with our weights and measures, would be the most convenient way of making it up. Only it must be remembered that to make a solution which shall contain one grain or one minim of active ingredient in ten minims of liquid, we must either take one troy ounce (480 grains) and make it up with water or whatever liquid is used to ten times 480 minims—that is ten fluid ounces; or, if an ordinary ounce of 437½ grains be taken, as in using a bottle of pyro., this must only be made up to measure ten times 437½ minims, or about 9 fluid ounces.

If, instead of making it up to nine, it be made to measure ten fluid ounces, then we only get $\frac{9}{10}$-grain instead of one grain in each ten minims. Some will perhaps think that everybody knows this, but as a matter of fact some do not. I was rather amused a short time since, on reading an article by a gentleman from the North, to find him saying, after giving minute directions as to preparing the solution for his developer, that he took ten fluid ounces of this solution and poured it on to one ounce of pyro., one grain of which was then contained in ten minims. As a matter of fact, the pyro. itself would take up the room of about half-an-ounce of liquid, or 240 minims, which, added to ten fluid ounces, would make 5,040 minims. If we divide this by the number of grains in the ounce of pyro, 437½, we have—

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437·5)5040(11·5
      4375
      ----
       6650
       4375
       ----
       2275
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That is to say, one grain in eleven and a-half minims; or, in other words, when the experimentalist thought he was using ten grains of pyro., he was really only employing eight and two-thirds grains—not much difference, perhaps, and near enough for rough-and-ready purposes, but scarcely entitled to be called accurate.

The expression of quantities in parts and percentages would, however, somewhat pave the way for the metric gram, which will one day, doubtless, become the universal weight, as English with a reformed spelling will probably be the universal language.

ON PLATINOTYPE.

By W. Horseman Kirkby.

I have for the last two years given up printing in silver and taken entirely to platinotype, and the result is to my entire satisfaction. I am pleased to say that many of my friends who at first objected to the comparatively cold tones have now come, and others are gradually coming, round to my opinion. Of course, at first the bulk of people, having for so many years been accustomed to the warm tones of silver prints, are prejudiced in their favour. Public opinion in this as well as in nearly everything else always runs in a groove, and it is proverbially difficult to get an Englishman out of a groove. They, therefore, expect that a photograph must be always of a brown or purple tint; but fashions change, although perhaps but slowly, and the time will come when these tones—at least for many subjects, such as landscapes—will be a thing of the past. No doubt, for portraiture the present style will long hold its day.

A short time back I made a few silver prints, for experiment, to see how my present work would look in them, but the result has more than ever confirmed my partiality for platinum pictures, which, beside being so much more artistic and giving more atmosphere, &c., are said to be permanent. Few or none of us looking back at an album of (say) ten years' old cannot but find many of the pictures faded and their beauty all gone, and there is good reason not to expect the same with platinotype.

One warning I will give, and that is to occasionally see that the chloride of calcium in the storing tubes is dry. The only serious failure I have had was from this cause. A batch of prints on paper that I had had for some months turned out muddy-looking with no pure whites. On pondering over it I bethought me of the calcium, which I found was saturated with moisture—so much so that it was quite a pasty mass. A hot shovel on a gas stove soon put this right, and I have not been troubled in that way since. I now take care that I can "hear" the calcium rattle on shaking the tube; if not, I resort to the shovel again. The only difficulty with this process is in judging the right depth to print to, particularly with a new negative; and I have thought it might be possible to make this easier by examining the print through coloured glasses—what colour or depth of colour I cannot say, for I have had no opportunity for experiment. I throw out this suggestion in the hope that some one may feel inclined to follow it up; for if this difficulty could be removed it would be a great boon.

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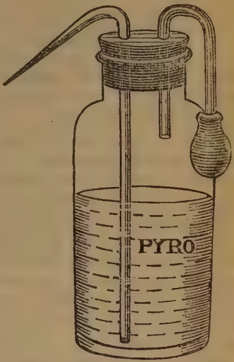
ANOTHER METHOD OF PRESERVING PYROGALLOL IN SOLUTION.

By W. M. Ashman.

There should not be the least difficulty in compressing pyrogallol into a much smaller space than it generally occupies; still, until a more convenient method of issuing this substance is adopted by the manufacturers, it might be worth while considering how best we can condense this bulky substance for ourselves with the least possible inconvenience.

The plan suggested by Mr. Baker, viz., that of acidifying with nitric acid, works very well; but it does not prevent the absorption of oxygen for a long period. Sulphurous acid behaves better in this respect, and has only one drawback which need not be of serious importance.

One-ounce pyro. bottles range in liquid capacity from seven to thirteen ounces, and, to avoid the trouble of weighing off proportions of an ounce, I would suggest replacing the ordinary bung with a rubber stopper, bored and fitted with two pieces of glass tubing, somewhat similar to the chemist's wash bottle, except that the larger bore is closed with a flexible cap or ball. This flexible stopper will probably fit any of the ordinary commercial bottles.



To the dry pyro. introduce two and three-quarter ounces of distilled water and four ounces of sulphurous acid (P.B.), which gives us a stock solution approximating very closely to sixty-four grains per fluid ounce, reckoning the quantity of pyrogallol present as something near 437 grains. Supposing the delivery tube has been drawn to a point and graduated with a file, no difficulty need be experienced in forcing out a quantity equal to two, four, or six, or any number of grains, or a fine stream may be run off into a graduate. Negatives developed with pyro. preserved in this manner should not appear yellow when the carbonates of soda or potash are substituted for ammonia, provided a due proportion of sodium sulphite be employed with the alkali. The drawback to which allusion has been made is the poisonous nature of sulphurous acid gas when inhaled in an apartment which it has been allowed to pervade. By confining the gas in the manner suggested there is no chance of escape until the developer is mixed, when the dilution immediately renders it innocuous.

"CAREFUL BOY" DEVELOPER.

By Duncan C. Dallas.

At one of the discussions on that inexhaustible subject, development, at the Photographic Club—an institution, I am happy to say, rapidly rising into importance—I advocated doing away with solutions of pyro., and mentioned that I had for some time worked with pyro., washing soda, and bromide, each weighed out and put in separate packets to be added to the water just before using. "Look at the trouble," was immediately replied. "Very little," I answered; "a careful boy can weigh out and packet a good supply in an hour." "A careful boy! Where is he to be found?" and a hearty laugh greeted my suggestion. Well, I must admit that the "careful boy" is almost a *lusus naturæ.* Still, the term "boy" is elastic; and even if you do not secure the services of an "old boy" there are young ones to be got.

Photography has such fascinations for youth that it is just one of the best schools for training "careful boys." "Boy," however, may include, metaphorically, your assistant of any age who is not too proud to do a little thing well. And how much depends on doing little things well in photography! It is the wonderful sum of littles!

The great advantage of the "careful boy" developer is that you know with what you are working, and can easily change your proportions to suit your work, the exposure, or the class of plate. Here is the formula:—

Pyro.	5 grains.
Washing soda	10 ,,
Bromide of potassium	2 ,,
Water	2 ounces.

When the plate is washed after fixing a clear, yellowish tinge will probably show itself in the transparent parts. I have not found this the least detrimental. It can, however, be easily removed by using Edwards's solution, namely, alum, citric acid, and sulphate of iron. This not only clears away the yellow tinge, but (at least in my experience) intensifies the plate. I find it best to use this clearing solution very much weaker than recommended by Mr. Edwards. I pour it on *before washing away the fixing solution.* Very moderate washing of the plate after this is required, and, as I do not wash between development and fixing, one of the tedious processes in gelatine dry-plate work is reduced to a minimum. I may say, however, with regard to efficient washing, that large doses of water are not needed. Sluice for a few seconds, and then hold up till the water drips from one corner of the plate. Repeat this about a dozen times and you may pretty surely reckon that no injurious "hypo." remains on the film.

REDUCING NEGATIVES INTENSIFIED WITH MERCURY.

By A. Donald.

It is often observed that there is no satisfactory method of reducing mercury-intensified negatives. As my practice all the season has been to reduce when necessary negatives intensified with mercury, I am inclined to say the assertion requires qualification. Doubtless it refers to negatives whitened by mercury followed by ammonia—the almost universal manner of intensification. Were the cyanide of silver method adopted a greater power over the gelatine negative would be secured by reason of its being easily reduced. The mode of operation is an extremely simple one. The only danger is lest it be overdone, and allowance must be made as regards the difference of a gelatine negative when in a dry and, on the other hand, a wet state.

If a negative be too dense when removed from the cyanide of silver bath flow over it a *weak* solution—say two ounces of a saturated solution to a pint of water—of hyposulphite of soda. The action which follows is a rapid one, and a second or two sometimes suffices to produce the requisite effect. Water should be handy, into which the negative should immediately be plunged and well rinsed before examining it. On examination it will now be found more harmonious and the colour unchanged, excepting in so far that the film will be somewhat thinner. If the reduction be insufficient the operation can be repeated. The negative requires, of course, to be well washed afterwards to free it from hypo. As to the keeping qualities of negatives so reduced, I can only say that if the primary operations of fixing and well washing be properly performed I note no difference, so far as my experience goes, from other negatives not so treated.

Should a negative that has been intensified and varnished be found to give hard prints, the varnish can be removed and the operation of reduction performed in a similar manner. To remove the varnish flow over the negative sufficient methylated spirit to cover it. Allow the spirit to remain for a little to penetrate the varnish, drain on to a tuft of cotton wool, and then gently polish, so to speak, the face of the film. Once more flow with spirit and clear off with a soft piece of clean linen rag. Afterwards immerse in water, when any gum still adhering is easily removed and the negative ready to be reduced.

HYDROKINONE DEVELOPER.

By W. T. F. M. Ingall.

Take of—

Saturated solution of carbonate of potass	1 ounce.
Water	4 ounces.

Pour the above over the plate, let it lie on it a minute or two, pour it back into the developing cup, and add—

Hydrokinone solution	1 drachm, =1 grain.
Uric acid	10 minims.

On reapplication to the negative the image will almost immediately but slowly develope. Should the image not appear shortly, the plate has probably been under-exposed, when the above must be washed off and the same re-applied, *substituting*, however, twenty minims liquor potassæ B.P. 1058 for the uric acid.

The negative will show hardly, if any, perfectly clear glass, but the resultant print will be very soft and give a perfect gradation of tones.

Toning Formula.

Carbonate potash	20 grains.
Gold	2 ,,
Water	20 ounces.

EMULSION FROM SPOONS—NOTES THEREON.

By J. J. Hollway.

There are few things the amiable beings who do us the honour to preside over the comforts of our homes dislike more than having their numerous belongings stained or disturbed by what they good-naturedly and resignedly call "messes." At the risk, however, of incurring their displeasure, I will bring under the notice of those amateurs who like dabbling in chemistry as a relief from the intellectual labour involved in making pictures—taking it for granted, by the way, that they are in the "throes of composition" is their normal state—a simple method of gratifying their inclination, and at the same time utilising material which might otherwise be useless.

There are few houses of many years' standing which have not accumulated a collection of articles once useful, but which, from wear and tear and accidents, are rendered useless for either utilitarian or decorative purposes. Broken-backed teaspoons, mutilated earrings, or other personal adornments, and many silver scraps of a like nature, consisting of things which are not worth repairing, if sold as old silver would fetch next to nothing, may be treated so as to utilise every particle of precious metal they contain. The process is very simple and, of course, thoroughly well known to the chemist and manufacturer; but it is very often just these "very simple" things which "every schoolboy knows" that we amateurs are glad to hear about. To begin: dissolve your silver scraps in nitric acid, using a glass vessel and facilitating the operation by placing it in water kept warm till the solution is complete. Its colour will probably be green, owing to the presence of copper.

The next thing is to separate the two metals by precipitating the silver as chloride. To do this, dilute the solution with a quantity of water (say) double its bulk; then, laying the kitchen under tribute, add some common table salt—a little at a time—gently stirring with a glass rod, the effect of which will be to throw down a very copious white cloudy precipitate of chloride of silver. This should be done in a weak light or at night, or you may discolour it and to some extent waste it. Keep adding the salt till no more chloride is formed. It must now be freed from foreign matters by washing, which is done as follows:—Let the chloride settle and pour off the liquid as far as possible; then fill again with water, again pouring off, repeating the operation three or four times. Now get a strip of sheet zinc, cut it into spirals with a pair of shears or strong scissors, and, putting the pieces into the vessel containing the chloride, pour over the whole a mixture of sulphuric acid and water in the proportion of one of the former to ten of the latter. This will cause effervescence, so that a vessel holding double the volume operated upon should be used (a large jug answers very well). It may now be left for several hours, being stirred occasionally to bring every particle of chloride into contact with the zinc—a very necessary measure, for any not reduced will be wasted. When all action ceases take out the pieces of zinc and carefully pour off the liquid, when you will have a quantity of pure metallic silver in a very fine state of division, and in the form of a brown spongy mass. The whole process up to this stage is for the purpose of eliminating other metals which are always mixed with manufactured silver and gold to render them workable.

Having obtained our pure silver it is necessary to wash it as before (by decanting) and then dry it, which can easily be done in the kitchen oven or on the hot plate. The next step is to redissolve it in nitric acid, and then drive off the excess of acid by evaporation. This last *must* be done in the open air, which I have found to be a very easy matter by the use of one of the small oil stoves now so common. The glass dish containing the silver and acid is placed in a tin dish filled with sand, the stove is turned on, and the whole put into a tool-shed or outhouse and left to "cook." When the acid has completely evaporated there will remain in the glass dish a cake of nitrate of silver. This may be recrystallised by dissolving it in a very small quantity of boiling water (the less the better), and as it cools it will deposit the crystals, which can be dried with a little heat—not too much, or they will be melted. The liquid remaining will contain some silver, and should, of course, not be thrown away.

Silver nitrate made in this way may possibly contain traces of zinc, and perhaps be not quite so good a colour as that purchased; but produced as described it is pure enough for making emulsions, which is saying a good deal. In fact, one of the most rapid and cleanest-working emulsions I have made was from home-made nitrate. The main thing to be observed in all the operations is cleanliness, as any trace of organic matter (*alias* dirt) will cause the reduction of the silver in a metallic form. For this reason it is desirable to use glass vessels instead of any sort of glazed earthenware for the evaporation and subsequent re-crystallisation.

Here are a few things I noted in making several batches of emulsion during last winter. First, those formulæ giving a large excess of bromide tend to increase the time of boiling before sensitiveness can be gained, while those in which there is but a slight excess give the blue colour in much less time (other things being equal)—a decided advantage, as lengthy boiling introduces troubles of more than one kind. I have obtained the best results when using the minimum of acid, and when the boiling operation has not exceeded thirty or forty minutes, being in agreement with a writer in a recent number of the Journal in believing that more than a trace of acid destroys the rapidity, lengthens the boiling, and in the end produces a plate on which it is most difficult to get density. With respect to the emulsion-makers' nightmare—green fog and its varieties—I have tried the addition of free iodine to the finished emulsion, and the effect in clearing is certainly all that can be wished. But what a pity it is there is so often a drawback to these good things; it lowers the speed very much—at least such is my experience. Iodine will effectually clear off all traces of green and yellow or other chemical fog; but as it is generally rapid emulsions which are affected in this way the advantage is *nil*, for you might as well make a clean, slow plate without it. As a general rule, however, I find that a plate which does not *show* fog under the developer is capable of producing good work. Frequently in an otherwise good plate the fog will not be visible till after the fixing, when any of the clearing agents can be used to get rid of it; but when the unexposed film can be seen to darken under the developer it is time "to begin again."

For a long time my difficulties in drying plates were very exasperating, but now I have conquered them. One must not rail at our text-book instructors, but in elementary instructions for making emulsions you will generally find it stated that "a good drying-box is a most necessary article," or words to that effect. Acting on this, and not feeling disposed to pay the somewhat high figure required for the shop article, I set about making a fearful and wonderful arrangement in wood, tin, and wire (since consigned to the lumber room), only to find that my plates were being spoiled by slow and irregular drying.

I finally discovered that a drying-box (good or otherwise) was *not* a *sine quâ non*. My plates are now dried in an open room in about 36 hours, whereas with my extemporised box they took four or five days. The ends of the racks being supported so as to keep the plates a few inches clear of the table, they dry evenly, and, if ordinary care be taken, without any dust settling on them. This arrangement, of course, presupposes that a room can be kept entirely light-tight during the drying—a condition not hard to fulfil by those who are the fortunate possessors of a "den;" and I apprehend that no one who could not get the exclusive use of one room would find it worth while to start emulsion making, even for the sake of the pleasure derived from experiment. Those who try this way of drying plates will not readily be annoyed with a special and bulky piece of apparatus, when it can so easily be done without, in coating a dozen or so plates with a few ounces of emulsion. For my own part I wish that I had stumbled on the simplest way first instead of, with the usual perversity of human nature, last.

A CHEAP INTENSIFIER AND OTHER HINTS.

By W. Ivanhoe Thomas.

I am an amateur, and possibly the suggestions I venture to make may not have much weight, especially with professional photographers who, as a rule, I know do not care to intensify negatives. But in instantaneous photography—of which during the past season I have done a good deal—one is often compelled to do so if it be wished to obtain good results.

Until last summer I have always used the ferrous oxalate developer and intensified with the same, obtaining very fair pictures. This I have now discarded and use only the washing-soda developer as per formula given in last year's Almanac; but, with this modification, instead of using one grain of pyro. to the ounce I find three grains yield better results.

It was whilst using this developer the thought struck me why should not the washing soda take the place of ammonia in that mode of intensifying. I tried it, and found, much to my delight, it acted even *better* than ammonia, producing results rich in contrast, the shadows being beautifully clear and of splendid printing density, instead of making a thick negative like one gets with ammonia—requiring hours to print.

The change is slow and perfectly under control, and for negatives requiring a small amount of strengthening I feel certain this is the best. I have tried many modifications with the mercury solution, but find the following mode of intensifying produces the best results.

Make a saturated solution of bichloride of mercury in cold water—the water will not take up too much—and a few crystals in the bottom of the bottle of solution will not hurt. Immerse the plate and watch it until the plate begins to whiten, and then wash thoroughly so as to get rid of all possible trace of the mercury. Now immerse the plate in a saturated solution of common washing soda. The plate will gradually turn a rich brown colour. Leave the same in until the brown colour has gone right through and all trace of the whitening of the plate disappears. Now, if the negative be not sufficiently dense repeat the process. You need have no fear as there is no clogging of the shadows or intense yellow films, as I have often found the negatives go when treated for a second time with ammonia and other intensifiers, but I think you will generally find the first immersion sufficient.

The points I have particularly noticed are these, namely:—1. Directly the plate begins to whiten take it out and thoroughly wash. Prolonged immersion in the bichloride solution in no way renders the negative more dense; in fact, it is better to repeat the process once or twice until the density required is obtained than leave it too long in this solution.—2. Negatives over-exposed and rather foggy can be made to print satisfactorily, and all fogginess generally is cleared off. I have a negative of a snow scene, taken some three years ago, which I had given up all hope of being able to obtain a print from, and after treating it as above it printed splendidly.—3. Negatives developed with ferrous oxalate intensifies splendidly with it. 4. If, after intensifying, you get the negative too dense it can be reduced by placing it in a very weak solution of sulphuric acid and water; the stronger the solution the greater the reduction. On this I will say nothing more than "try it," and I think you will always use it.

With reference to the washing soda developer: I would say a word—that in my opinion it ranks first of all developers. It never loses its strength with keeping and it is very cheap. It will give density and detail when ammonia and the oxalate only yields shadows and nothing; in fact, for instantaneous photography it is *the* developer. I have recommended it to one or two professional photographers, and they now swear by it. If you have not done so try it yourself, and I am sure after the first trial you will always use it.

N.B.—For clearing the negative after the alum bath use sulphuric acid and water—about three drops of acid to the ounce instead of citric acid—and you will find this a great improvement. With this developer I find Sykes' "Albert" plates give splendid instantaneous pictures, they being wonderfully rapid and also very cheap.

MAGIC LANTERN ENTERTAINMENTS.

By G. R. Baker.

"Why! you did not have a mishap!" Such was the remark made to a friend of mine at the close of an entertainment illustrated by dissolving views with an oxyhydrogen optical apparatus. "No; I never do," was the reply, "because I do not object to rehearsals." It turned out on inquiry that the surprise shown was due to the fact that two or three lantern exhibitions had previously been given in that building, and at each some difficulty had arisen. The gas in one case was exhausted before the slides were half shown; in another a series of sharp reports and failure in dissolving, and finally total darkness; and in a third, through careless manipulation, a ludicrous effect had been produced by putting slides in the lantern the wrong way up, so that they were inverted on the screen, bad "registration" causing the "effects" not to appear in the correct place on the set scene.

Everyone interested in the optical lantern would be pleased if there was no foundation for such remarks; and if anything can be written that will put amateurs and occasional exhibitors more on their guard against occurrences of this kind it will probably not be without value.

From my connection with a great number of exhibitors, both professional and amateur, I can unhesitatingly say that nine-tenths of the failures are due to imperfect preparation and want of rehearsal. It seems to be a popular notion that any one can take a magic lantern and set of slides, and exhibit them in public. Well, so they can—in a way; but, as there is a right and a wrong mode, it invariably happens that it is the latter, for the simple reason that what little preparation is made is done in a hasty, rough-and-ready fashion. In the old days of the oil magic lantern and coloured—or rather daubs representing—views, it did not much matter, as any little difficulty simply caused further amusement to the audience, whose whispered criticisms of the objects on the screen was the most enjoyable part of the proceedings; but now the magic lantern toy has been superseded by the scientific instrument, "the optical lantern," in either its single, biunial, or triple form, and, with the splendid examples of photographic art capable of enlargement to thirty feet in diameter with perfect fidelity, such failures ought certainly not to occur in public.

No theatrical manager would risk his reputation by producing a new play that had been insufficiently rehearsed, and why should the judgment of an audience be sought in the matter of a lantern entertainment until the promoter of it is *satisfied* that there is every chance of its going off successfully? I would, therefore, strongly advise all entertainers, before they go into public, to have private rehearsals until "their show is perfect"—not limiting it to one or two, but have as many as necessary, until they are quite satisfied that their operator can manipulate the apparatus successfully and understand his cues; for nothing is more unpleasant for the lecturer than to be describing one view while an entirely different one is on the screen. I would also suggest that the lecturer should get a "friend" to attend his rehearsals, for a friend will tell you of a fault; and many lecturers would be all the better for a few hints and suggestions respecting their elocution.

The subject of correct registration is almost more than can be dealt with in a short article, but I would just mention one or two salient points: 1. That it is wise to have registering masks of definite shape and exact size in each lantern immediately behind the slide if it be a painted view (or an effect), and in the lantern carrier if a series of photographs are to be shown; this will only allow of a certain amount of the photograph to be seen, and will correct any irregularity in the cutting of the glass of the slide or in placing on a mat. 2. That the lantern should be tested to see that equal-sized discs are produced with each front in the dissolving view apparatus, and also that they superimpose, and not appear slightly above or at the side of one another. 3. That in commercial lanterns, even of the best make of ordinary pattern, the registration only holds good at the *one* distance—that at which the apparatus was from the screen when the slides were marked or specially adapted to the lantern stage.

In these days of so much hiring of slides for the night, it is no wonder that a nondescript display is the result; and, although in some quarters it may not be practical for the lecturer to show slides only that are his own property, I would strongly advise him to shorten his entertainment rather than exhibit indifferent pictures, or what do not assimilate with the rest, or are ill-matched for shape. If he must hire effect slides and show them without rehearsal, he should take care to select those he is certain his operator can manipulate without having to experiment before the audience; for, where there is one who is apt at finding the registering point by a very faint light from his second lantern, there are a dozen who would reveal their action to the audience and spoil the effect.

In conclusion: take care before embarking in a speculation for pecuniary gain or charity to well announce your entertainment by having plenty of bills and posters in advance, unless you are specially situated and by patronage of institutes, the clergy, or from special causes your audience *is assured*. Do not leave anything to chance, for you must understand that the English public generally are busy with their own affairs, and, unless they are roused and made to understand that something worth their while to leave the comforts of home is going to occur, they maintain their accustomed indifference. Be certain that your slides are all clearly numbered, and in such a way that in the dark the operator cannot make a mistake as to right side and proper way up; also, that he has a numbered list exactly agreeing with your lecture list. Before starting for the place of entertainment check your list of requisites (previously passed in the lantern case, when calmness and time allows you to think of everything), and if some one else is to supply the gas make sure hours beforehand that it is ready and in your possession. See that all parts of the jets, dissolver, &c., are free, and, above all, see that the india-rubber tubes fit perfectly on the fittings and are gastight, the gas bags kept out of harm's way, and a *constant* pressure secured. If these precautions be followed it is thought that no mishap or failure can occur.

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HOW TO DO WITHOUT THE FOCUSSING-CLOTH.

By A. Johnston.

Very recently I was asked by an artist if it were possible to do without the focussing-cloth when working out of doors. This artist was in the habit of carrying a quarter-plate camera for securing studies to aid him with his paintings. Perhaps the method I adopted to get rid of the cloth in the case of the artist's little camera may make a suitable subject for the Almanac.

The plan was as follows:—The ground glass was removed and a plain one substituted. Now, with an eyepiece carefully focussed for the thickness of the glass, very accurate focussing may be made without a dark cloth. As the image cannot be seen on the screen without the focussing eyepiece, some sort of view meter becomes necessary.

With the camera mentioned (which was one of the kind known as an "instantograph") it was found sufficient to raise the focussing-screen on its hinges till it stood perpendicular, when, if the eye be kept distant about the focus of the lens used, the amount of subject will be included within the frame.

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OUTCOME OF MY LABORATORY EXPERIENCE IN 1884.

By A. F. Genlain.

Hint I.

The effectual removal of grease from gelatine, and, consequently, of those spots called "pits," has been and is still a mystery to many. The neatest way to effect this, on a small scale, is simply to filter the finished emulsion through medicated cotton, the fibres of which have been slightly loosened first. A plug of this put in the neck of a funnel is all that is required. The cotton should not be moistened.

Hint II.

If prevented from using up all your emulsion at the time of coating, you may happen to find the bromide of silver all precipitated when you next take it up. Do not on that account throw it away. To make things quite right again, if the emulsion be otherwise sound, all you have to do is simply to add from fifteen to twenty grains of Heinrich's gelatine, or of Nelson's "X" opaque, to each fluid ounce; well stir, and coat away! Preferably, dissolve your gelatine separately in as little plain water as possible, let it cool a little, and add to emulsion.

Hint III.

To ensure emulsion against all frilling, and obtain a plate that will give a powerful, crisp image with the emulsion referred to in Hint V., dissolve three grains of chrome alum in one ounce of water, and of this add ten drops to each ounce of emulsion.

Hint IV.

Use the soda developer for anything and everything wherever you want superior printing results, and, if the plates you are using will stand it, fully rely on the following formula:—

Common water	40 ounces.
Ordinary washing soda......................	4 ,,
Bromide of potassium (in summer)	40 grains.

In winter twenty grains of potassium suffice, and in spring and autumn thirty grains. To each ounce of the above put one grain of dry pyro. just as you are about to develope. N.B.—Flooding the plate with water well charged with rock-alum, before and after fixing, is advisable in summer.

Hint V.

To complete the emulsion formula given at page 56 of the Almanac for 1883, add three or four grains of iodide of ammonium (or of potassium), to every five ounces of emulsion, and, if you want it very speedy, boil for half-an-hour instead of a-quarter of an hour, as therein directed. The essentials in this excellent formula are Mr. J. A. Forrest's.

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PHOTOGRAPHY UNIVERSAL.

By W. Neilson.

When a subject extends into different departments, each successive department arriving at higher results, it is desirable the worker in the original department should be acquainted with these results, as such knowledge will dignify the work he is engaged in, and so tend to elevate himself. Photography is such a subject. Important as it is in the domain of art, it promises to be far more important in the domain of science. A glance at the subject will substantiate this.

First, as a specimen of the uses to which it is applicable, notice may be taken of its employment in literature. At a meeting of the Library Association of the United Kingdom, held in Dublin this year, Dr. Garnet, of the British Museum, said that obscure title pages, illustrations, maps, valuable works, and books in antique spelling had been more accurately copied by photography and at less expense than by the system of scribe work. Mr. Stevens also stated that he had a small book photographed at a cost of a few shillings, the original of which had recently been sold in London for £300; and that the copy was for every purpose quite as good as the original. The meeting proposed to appeal to the Government to establish, in connection with the British Museum, a photographic department for the reproduction of State papers and historical records, which at present are practically inaccessible to the great majority of students.

Photography has been usefully applied in anatomy, physiology, and pathology; and especially in the late transit of Venus, on which the calculations of the distance of the sun from the earth are founded. Hitherto astronomers have been chiefly concerned with the movements of the heavenly bodies, but now they are beginning to investigate their individual constitutions. The means they chiefly rely on to effect this are the spectroscope and photography.

As yet little is known about the sun. The spots on the sun constitute one of its mysteries. These spots are immense gulfs in the sun, measuring in extent from ten to thirty thousand miles; and it is believed that the telescope has fathomed one of them to the depth of five thousand miles. These gulfs are filled with substances like endless floating filaments, and boundless volumes of vapour-like whirling masses; and these are continually shifting and whirling at about the rate of fifty miles per second, in a temperature far surpassing the hottest furnace. The questions are—Do these solar tempests carry the surface matter of the sun into its interior, or do they throw up to its surface the unknown contents? And what is the cause of these tremendous actions, and what results do they produce? Possibly, these questions may never be fully answered, but photographs are now taken of these spots, giving exact portraits of their varied conditions, and it is believed that by comparing these the philosophic mind may obtain a clue leading towards the truth.

A total eclipse of the sun is the most magnificent of all spectacles. When the moon has almost passed between the sun and the earth, answering to the rapidity of its motion, its black shadow with nearly the speed of a cannon ball rushes along the earth, and suddenly the sun becomes black. It is said to be a fearful sight, nature seeming unnatural. As the sun vanishes a luminous corona becomes visible around it, with a radiance that extends millions of miles. What this corona is has been one of the puzzles of astronomy. The spectroscope seems to prove that it contains a glowing gas. Its shape and extent are continually changing with great rapidity, involving various wonderful phenomena. It has been photograghed during the eclipse—the only time when it is visible; but as an eclipse only lasts from two to three minutes the photographs taken then can show it only in one or two aspects. Fortunately Dr. Huggins has discovered a mode by which the corona can be photographed, when the atmosphere is clear, in broad daylight. In such circumstances it is not chimerical to expect that, when a goodly number of correct portraits have been taken of this shifting corona, some clue may be obtained towards the how and the why of its existence.

Thus photography, bearing on the secrets of the skies, is becoming a new power in astronomy; and it is not unreasonable to look forward to the time when, by its means, unprecedented results will be effected in the world of science.

It is well that photographers should consider this, knowing at the same time that when they are improving their processes, and discovering new modes and appliances, they are helping towards that future consummation.

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EXHIBITION AWARDS.

By the Rev. H. Victor Macdona, M.A.

At the present moment I am receiving a fair share of abuse for having had the temerity to call in question the medal awards made by the judges at the recent Exhibition of the Photographic Society of Great Britain in Pall Mall, and the thought struck me that I might do worse than take this as a text for my contribution to the forthcoming Almanac.

A friend of mine (one of the judges) suggested that it would be just the thing to do, so I at once decided to take his advice, and without further delay or preface I face the responsibility.

As matters now stand, there is something obviously wrong in the present system of medal awards at our annual Pall-mall Exhibition. The amateur interest of the country is not fairly represented on the judicial committee. Five judges are elected to examine the exhibits and award the medals. Out of that number two are amateurs, and three professionals. I was curious enough to make a scrutiny into the names of the exhibitors, and as far as my judgment could lead me I discovered that the great majority of them were amateurs. Well, I suppose I shall not be considered straining a point if I maintain that there is a little room for improvement here. This will appear to have something in its favour when we venture on a closer scrutiny of the nature of the awards that were actually made. Judge the surprise of the amateur landscape worker, when looking round the Exhibition, to find not a single medal awarded for pure landscape, while instantaneous studies scored at least three, and a mechanical process called "photo-engraving" was awarded another.

I have always understood that the purely artistic side of photographic work was that which, from the very nature of the case, gave so keen a stimulus to the researches of English and foreign amateurs; and that the only way to wipe away the popular reproach that we were disciples of a "black art" was to produce landscape pictures combining all those qualities of unity, balance, and breadth of treatment which are the cardinal conditions of all successful creations of the art instinct.

Those of us who have read the publications of Mr. H. P. Robinson *On Picture Making*, &c., will need no further explanations on this score, but feel more and more the importance of mastering all those details of composition, &c., which draw the line between what is artistic and what is not.

I venture to ask, after the recent experience we have had of the awards made by the judges at the late Exhibition in London, if this canon of procedure has been observed? For my own part I unhesitatingly say not, and until we get into another groove, and make a very marked reform in the *régime* of our future system, the reproach of mere mechanical or commercial success will still with just cause be laid at our doors.

I may repeat here what I have communicated in another quarter—that if the Photographic Society of Great Britain is to keep abreast of the age a large amount of radical reform has yet to be made in its system of procedure, and it is not for those who have its welfare at heart to criticise its shortcomings with any mincing or hesitating rhetoric.

These are not the days when any public body can assume the right of adjudicating in the public interests and then shrink from the responsibility of censure. This they are bound to face, and this (they have no other impartial course to adopt) they must face.

Another weak point in connection with our Exhibition is the permission granted to commercial speculators to turn the picture gallery into an emporium for trade by piling up on tables the latest improvements in the manufacture of cameras, shutters, tripods, and soforth. Much as we may desire to see an incentive given to the discovery of improvements in the mere tools of the photographer, we may pay too large a price for this convenience. If I might suggest a compromise I would say that a separate room might be rented adjoining the Exhibition, where the apparatus of the artists may be inspected. Fancy an array of easels, brushes, and oil tubes piled up in a corner of the central room of the Royal Academy, and attendants present explaining to the public the latest improvements in pigments, canvas, and camel's-hair brushes! I offer these suggestions with deep respect for the consideration of those who now hold the reins of government at all our photographic exhibitions.

Let me assure the Editor of the ALMANAC that what I have said has not been with any feeling of animus or disappointment. So far as I am personally concerned there has not been any occasion for it. I have written with the single aim and intention of ventilating a question of importance to the whole community of amateur workers; and, just as medical men are in the habit of prescribing a tonic for the restoration of a constitution that has fallen below *par*, on exactly the same lines do I venture these friendly criticisms, hoping they may be received in the spirit in which they are offered—to encourage a deeper interest in the pursuit of an art and a science which has a great future before it, and one whose curious demand on our time, in season and out of season, we must confess our utter inability either to explain or to resist.

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TRIFLES.

By HERBERT S. STARNES.

IN thinking over various subjects which I might select as my annual contribution to the ALMANAC, I decided that the above would be the best, because, possibly, it may point out to amateurs a few rocks on which they might run aground, with the result of spoiled plates; and, if your professional readers do not find anything they did not know (and act up to) before, I must refer them to many other articles in this book, which will be useful and interesting to them alone.

I will, therefore, address myself to amateurs, and I wish to impress on them the fact that plates are spoiled—that is, they just fall short of being perfect pictures—more often for the want of attention to supposed trifles than from any other cause. The great difference between a good and a bad workman is that the former is particular about every small detail, concerning which the latter will say—"Oh! that is near enough!" and when the work is completed he will throw the blame on his tools, &c. I do not know anything in which this is more the case than in photography. Two men may use plates from the same batch, the same lens, and the same studio, but they do not use the same brains. The one looks after every detail before exposing his plate, and sees that his dishes and developing-cups are quite clean. The other does not, and wonders why his plates are always stained, and why his developer so soon gets the colour of stout. Of course the fault is never due to himself.

This reminds me of a "wrinkle" I picked up in the dark room of one of our leading landscape photographers a short time since. When developing I could not help noticing with what care he cleaned with a sponge and plenty of water his developing dish and glass. I also noticed what splendid negatives he obtained. On arriving home I at once decided to see if such care were really necessary; so I developed a plate in a perfectly-clean, white porcelain dish. After development I found there was a dark sediment over the bottom and sides of the dish which water alone would not get off. What a state some photographers' black developing dishes must be in! and yet they wonder why they get yellow, stained negatives.

On looking over some negatives of my own and others, especially landscape negatives, the subjects were well arranged on the plates, the grouping good, &c., but on printing from them they did not seem nearly so satisfactory. The subjects were not sufficiently condensed, and looked too large for the size of the prints. The cause was that we had been grouping and arranging the subjects to the size of the plate instead of the print. Anyone can try the importance of this by first grouping a subject on the ground glass, and then covering it with a black mask having an opening in the centre of only *the size of the print.* More often than not it will be found that an improvement can be made by either slightly shifting the camera or bringing the subjects nearer towards the centre of the picture. It is also so much easier to group a subject when the eye is not disturbed by seeing subjects beyond that of which the photograph is required. If it be proposed to vignette a landscape negative, always use an oval mask the size of the vignette, and a round one for lantern slides. We can then see exactly what will be in the finished picture.

Many photographs are spoiled through the principal subject being surrounded by commonplace details. Always vignette them out; they only detract from the interest of the picture. If a view consist of two or more detached subjects, instead of letting them spread out towards the sides of the picture choose a point of view where the subjects are brought together towards the centre. Compactness and unity will be the result.

Do not, as a rule, put the principal object exactly in the centre of the picture, and never close to the edges. Let it be in size proportionate to the dimensions of the print.

It often happens that long, straight lines are so connected with a subject that they cannot be suppressed. The only way a photographer can reduce their unsatisfactory effect is by the introduction of figures or objects to break their continuity, which by their forms will divert the eye from the general straightness of the lines. The great object in the introduction of figures is to give life and relief to the picture; but they must not compete in interest or size with the principal object of the landscape. They should only be placed in spaces where the landscape interest is comparatively weak, such as in an open expanse of field, or to break long lines running through the picture.

I would like to call attention to some important points in connection with light and shade, but I am afraid if I were to do so the Editor would think the article too long, so I will conclude with a few remarks as to amateur portraiture. Avoid it if possible unless you have a well-appointed studio. It will also be found very expensive and troublesome, on account of the number of prints required. I know it is so difficult to refuse, especially when a pretty young lady appeals to you! "She hates to go to those horrid photographers; they put her head in a vice, and make her feel as stiff and uncomfortable as possible. She would almost as soon go to a dentist's." She might add that she saves 15s. or a guinea by the transaction. And then, when the portrait is in her album, she tells all her friends that "that is not very good; it was only done by an amateur." If you are successful it is even worse, because you are at once expected to try on every member of her family, "because you took her's so nicely, you know."

Do not tell a sitter "to smile a little" just before exposing a plate. Remember, a lifelike expression is not obtained by the will but by the unconscious working of the mind. Tell some interesting anecdote (not a side-splitter), or put an amusing picture at the place where you require the sitter to look. Then you will often be able to catch a more *natural expression* than a professional photograph, because *that* can only be obtained when the mind of the sitter is undisturbed by strange and unusual surroundings or thoughts.

In the case of a lady sitter, see that the body of the dress is not wrinkled—that the wrists are not too far through the sleeves, and such points; because in a lady's sight small details of this kind condemn portrait at once. Though she would not confess that the sole reason why she does not like her photograph is because it looks as if her dress did not fit, or that her new coloured necktie did not come out so well as she expected, &c. Professional photographers know well what it is to suffer through such trifles.

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AN EXPERIENCE.

By "Boode."

On June the 16th I started on my second visit to Switzerland. On the former occasion I developed my plates abroad, and very troublesome I found it, especially after a fatiguing day. Therefore I decided that, despite the dynamite scare, I would run the gauntlet of the *douane* and bring home my plates undeveloped in a dark box.

I placed the box in an ordinary hand-bag, which I always held in my hand when called upon to face the "inquisitors." It passed entirely unnoticed both through France and Switzerland, and on landing in England the kindly intervention of the captain of the steamer procured for me an all-powerful hieroglyphic on the side of the bag. Thus I and my plates passed by, but not through, our dreaded custom-house.

I have never had any mishap with dry plates, or with my camera. On both occasions I carried it precisely in the same manner, viz., packed in a Gladstone bag with lens, double backs, cloth, and shutter. This fits easily into a small upright leather trunk with a lid. Round the bag I pack my plates, secured in wooden boxes, and pad the whole either with developing apparatus or with books, according as I am going to develop abroad or not.

This is my second tour among the Alps in June, and, as last year, perfect weather attended my wanderings. We ascended the Gorner Grat on the 26th of June. It was a perfect morning. The slopes were hard snow, and as we reached the last the sun rose, and our path gleamed as with myriads of diamonds. On the summit *all* was clear. Not a cloud dimmed the prospect. Far away we saw the Jungfrau—Queen of the Bernese Oberland—and near at hand rose the glorious Mischabel range, Monte Rosa, the Lyskam, the Twins, and the Matterhorn. "I am glad for you," remarked our guide to me in German; "it could not be better." So sublime a spectacle is, indeed, not to be portrayed by words, and I am fain to leave it untouched in its purity like the untrodden snow we found there.

On our return to the Riffel I obtained a good plate of the Matterhorn, and later on a member of my party photographed the panorama of the Aletsch Glacier from the summit of the Eggischhorn. At the Riffel I noticed a Camberwell beauty, and the usual June complement of floral loveliness. The Martagon lily—of which the Psalmist has declared that "not even Solomon in all his glory was arrayed like one of these"—bloomed in the valley. For sublimity of spectacle, coolness, floral display, hotel comfort, and absence of crowding on the railway, commend me to early summer in Switzerland, and I look forward with rapture to more glorious days among the Alps in June.

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EXPERIENCES OF AN EXHIBITOR.

By B. Wyles.

Vivid sense of "deserving well of one's country," as, with a sigh of relief, a thumping big amount for carriage is disbursed, and the pictures that have engaged all hands and thoughts the last few days are packed on their way.

Railway officials quite sure "they'll arrive in plenty of time, sir!"—"rapid service of trains!" &c. Admirable system, the railway system!

Admiration *falls* a little on learning that carriage is charged a *second time* at the other end, and falls still lower during the considerable correspondence needed to get the error put right.

A fortnight's ignorance after the opening as to whether I am hung or not.

Receipt of catalogue at last. Find titles misprinted and partly omitted, till they read "neither sense nor lumber."

Wonder if it *be* as impossible, as it is said to be, to hang all of a series together—if ever an effort is made to do it—if even the hangers have a soul to appreciate the effect producible by massing together, as distinguished from the frittered-away look of a scattered distribution.

Condolences from unknown correspondents over my not getting the medal *they* are good enough to say I deserve; must try to survive it.

Offer to purchase 12 × 10 *negatives* of *good* subjects, instantaneous and free from defects, at the liberal rate of *two shillings each.*

Proposals to correspond with me—proposals to come and see me. Requests for information as to process, lens, and for prints, and "how to do it."

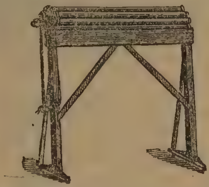
Then they say it *doesn't pay* to exhibit! What would they have?

MORGAN'S MULTIPLEX BACKGROUND STAND.

By George Mason.

In the currency of the year I think there has been no invention introduced to the profession of more general usefulness than Morgan's patent background stand. Amongst the general plethora of inventions that weekly crowd upon us, it has a chance of being overlooked or lost sight of; hence a short description of it in the Almanac will, I think, be received with pleasure by many readers who may never have heard of it.

This new stand possesses the advantages of being a labour-saving, space-giving, compact, ingenious piece of mechanism with which every photographer should be familiar. The following diagrams show the stand with backgrounds fitted ready for work, taking up no more space than a single background frame, thus getting rid of all the frames and other cumbersome arrangements in general use in the studio. Any scene in the set required for use can be brought to the front by a simple turn of the handle at the side, thus saving time and trouble. The raising and lowering of the scenes is so arranged that a single cord works any one of the set when required. By this arrangement all the backgrounds work on the same level, in one light, and in one plane. The whole moves on castors, so it can be moved to any angle to catch the light best suited for the subject.



Mr. Morgan has made a special study of background hanging, so that cracks and creases might be avoided and that the background may be so hung that it will roll up and down without defect or flaw during the whole time of its use. He gives the following instructions for the benefit of the profession:—

1st—Lay the canvas on the studio floor; be very careful not to allow it to crease in any way. Very few backgrounds are trimmed when bought, and it is of the utmost importance that they be so, and top and bottom made thoroughly parallel, else they will not roll evenly. To square the edges:

lay a straight-edge along the top of background, and cut with a sharp knife sufficient to make the edge straight. Measure with a tape line from the edge thus cut along each side to the bottom eight feet one inch, and again cut. This will make the top and bottom parallel. Next, square the sides as shown in *Fig.* 2, giving ½-inch taper as shown in *Fig.* 1, which will compensate for any divergence in winding on roller.

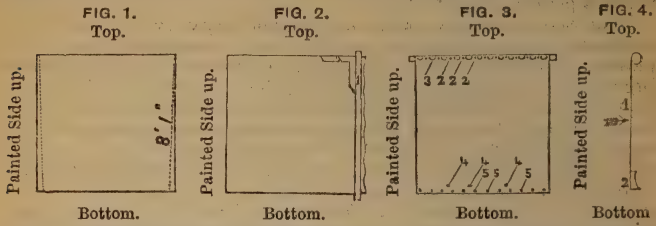
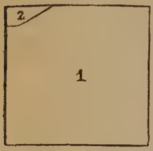


Fig. 1. Dotted lines show taper on background.——*Fig.* 2. Showing how to square the sides: 1, straight-edge; 2, carpenter's square.——*Fig.* 3. 1, roller; 2 2 2, tacks five inches apart; 3, coves cut with a knife between the tacks preventing bagging in winding up; 4 and 5 show the arrangement of tacks in on bottom slip.——*Fig.* 4 (section). 1, background; 2, bottom slip; 3, roller.——*Fig.* 5. 1, background; 2, paper.

To tack them on the roller: lay the roller on the floor and place the top edge of background along the line marked on roller as shown in *Fig.* 3; next tack on bottom slip on back of ground as shown in *Fig.* 3. The coves (3) to be cut after the background is tacked on.

FIG. 5.



Should the background show a tendency to run off at either end of roller, which sometimes happens where the paint is thicker at one side than the other, place a piece of paper shaped as in *Fig.* 5 behind the background, fastening it to the roller with gum (on the side opposite to where the background is running off), in such a way that it will be drawn in with the background when it is wound up.

◆

QUEER SITTERS.

By W. H. Hutton.

Their name is legion; in fact, it would be a rather difficult matter to pick out those who are not queer. Their peculiarities are not only numerous but varied, and the variety is not always charming. For instance: one morning early I was asked if I could "take" a dog. Being a modest man I did not say I could, but intimated that I would try. A rather rough-looking individual presented himself in the studio, carrying a large and evidently heavy sack. I inquired for his canine friend. The man heaved a sigh that carried an odour of tobacco with it, and began to open the bag. I looked on with wonder.

A "pig in a poke" I was acquainted with, but a "dog in a sack" was new to me. When the sack was opened (no, my friend, the animal did *not* begin to sing) the proprietor with great tenderness lifted out a great white beast with a most disreputable black eye. One of his remote ancestors had been of the breed known as "bull." His countenance was not one upon which a poet would like to dwell.

His coat was unkempt, his tail had been abbreviated, and he himself had been cut short in his career, for (whisper it gently !) he was *dead.* Some evil person had poisoned him, and his bereaved master "would *so* like a picture of him !"

On another occasion a young lady brought a sparrow to be taken on her finger. She said the bird was tame, and, a young lady being in the question, I would not think of disputing her word. But she must have forgotten to bring his tameness with her, for the creature behaved in a most dissipated, not to say wild, manner. He flew about the place, on the top of the backgrounds, under the furniture, and seemed to be in about three places at once. We—that young lady and I—had a high and festive time for half-an-hour, careering over the furniture and head-rests, executing perilous gymnastic feats, and getting into a not agreeable and dusty condition before we could catch the little fiend, while a roomful of intending sitters made ill-natured remarks. That was my first and last sparrow. Another lady of maturer years was photographed with her parrot—a gorgeous fellow, all green and scarlet. He could not talk, and so differed from his mistress.

These people had queer tastes ; but there are others with what I suppose should be regarded as afflictions, who are quite as troublesome. There is the ancient lady who is deaf, and with whom this sort of conversation takes place :—Photographer, with his most ingratiating smile : "Good morning, ma'am ; what style of photograph shall I have the pleasure of taking ?"—Venerable one, cheerfully : Yes."—Operator, keeping the smile in order with difficulty : "I quite agree with you, ma'am. Would you prefer a standing or sitting position ?"—The old lady puts on a comprehensive air and says : "I shall want a dozen of plates, please." The operator starts shouting, and the windows rattle ominously.

Then there are the people who, when taken profile, look full at the camera—the man with eyebrows on a patent elevating principle, and which rush up to the roots of his hair when he is requested to keep still—the person who continuously jumps, as though a series of small explosions were going on in his interior—the young lady with an idiotic giggle laid on at high pressure—all these may be interesting to the student of natural history, but photographically they are nuisances. Had the walls of the dark room ears, and could they speak, what tales they could unfold of the decorative remarks caused by queer sitters !

◆

PRACTICAL EXPERIENCES.

By W. Harding Warner.

For the consideration of patient workers in the now popular dry-plate process these few remarks are offered as experiences found in practice to be good and useful. Should they coincide with those of other photographic brethren an additional value will be given to them.

As to cameras : much has been said *pro.* and *con.* in The British Journal of Photography during the past year. I have a 9 × 7 camera made by Mr. G. Hare many years ago, and one after the same model, 12 × 8, by Mr. Otty, of Liverpool—both more than ten years' old—which have rigid base-boards. On the side of each has been put a scale from one to thirteen inches, by which, on affixing any lens, I am able to arrange the focus, using the rack and screw for fine adjustment. All the lenses used in either are interchangeable by means of adapters with a coarse thread. Sixteen to eighteen pictures can be taken by both cameras jointly in the course of an autumn day, changing the lenses eleven times. It takes seven minutes to put up, and less to take down and pack away—what can be wished for more?—some of the pictures being of large size.

The stand is my own, which has been in use for fourteen years and more, made by Mr. Henry Husbands, of Bristol. It has a solid top with a circular movement, with rising and falling legs to adjust to level either way, or for use on steps It can be used from one foot in height to nine feet, and is perfectly portable without being flimsy.

A word as to plates: those without iodide are found best for interiors and instantaneous subjects; while those with iodide give most exquisite detail in foliage, rocks, water, &c., the colour of the subject photographed largely influencing the exposure.

Developments are of two kinds, each suiting itself to the variety of plate in use. Acid pyro. with bromo-iodide plates oftentimes gives better results than alkaline development, whether of ammonia or soda, for constant successes.

It should be the aim of all to make every plate tell, and never to waste any (excepting accidents). Frilling will never occur if care be taken not to use too strong or too prolonged a development, either of alkali or acid, or too strong a fixing-bath. *Apropos* of this latter: care is often not sufficiently taken as to its acidity, alkalinity, or neutrality, as well as its strength. Just the clearing of the shadows is all that is considered necessary, forgetting the purity of the high lights. Bromo-iodide plates always necessitate a longer immersion. The writer, when away from home, pours his bath into a jug, adding a small lump of rock alum to precipitate the silver as a black powder, pouring off the clear liquid in the morning, and strengthening with fresh hypo.

Always use the chrome and citric bath both before and after fixing, if clear, bright negatives be desired.

A word, in conclusion, upon varnishing: The writer never uses varnish of any kind. From Messrs. Mawson and Swan, of Newcastle, may be obtained, at three shillings per pint, an excellent enamel collodion which forms the best protection; it will stand the hottest sun, while it is impervious to damp. Negatives have been placed in water bodily without hurt coming to them. Varnished negatives can be cleaned and revarnished; or the varnish can be completely removed, and the negative reduced after printing from, by Mr. E. Howard Farmer's process (red prussiate of potash and hypo.), and then finally coated with collodion, which is immovable and infinitely more serviceable.

◆

THOSE HANDS AGAIN!

By Joseph Harris.

"I always make such a dreadful portrait; my hands come out so badly. Please do not make me catch hold of a chair to prevent it from running away, or desperately hold on by the table as though I could not stand upright without support."

She was emphatically a "nice girl," possessed of a pretty, plump little hand and delicately-tapered fingers, and when she so pertinently alluded to the table and chair there arose a certain sense of humiliation at the truthfulness of the playful slap at what may be termed "the photographic pose." "Rest one hand on the table," says the manipulator of dry plates, when it is exceedingly questionable if, in the delightful calm of our everyday life, we stand at the corner of our mahogany and "rest one hand upon it," gazing the while upon vacancy. "Very well, then; if you were taken last time with a hand on the table, suppose we try this time with the back of the chair"—as though a lady or gentleman could not stand near a chair without taking hold of the back of it! What food for satire on the part of the coming New Zealander when poised on the ruins of St. Paul's and the photographic albums have been duly unearthed by the antiquaries of the period! How they will comment on one striking peculiarity of the old English race: they were so limp in their generation that they could never stand near a chair or a table without taking hold of it to save themselves from falling! For mercy's sake let us be wise in time and put up notices in all our studios—"Please do not touch the accessories;" and then we come face to face with my little damsel's question—"What shall I do with my hands?"

That too many of our *clientèle* have been over-photographed by inexperienced hands is evidenced by the fact that, if by any chance an unfortunate chair or table be introduced to fill up a blank space, a spasmodic endeavour is immediately made to clutch at it as if existence itself depended on the success of the effort; and, if this reprehensible proceeding be demurred to, an almost agonised entreaty follows—"Can you not give me something to hold? Can I have a book, or some flowers, or a fan?" It would appear that a sitter's hands could not be artistically arranged without the everlasting accompaniment of a book, or flowers, or a fan. Can we not dispense with these worn-out aids to "pictorial effect?" Can we not permit the hands to take care of themselves without over-exposing, and not suffer them to engage in occupations which bespeak but too plainly the reason of its arrangement—for the sole purpose of being photographed? This mute but elegant confession is sufficient to destroy the charm of any composition, however good in other respects may be the conception and the *technique*. An artistic portrait should not convey to the beholder the idea that the subject is before him simply to have his picture taken. There must exist that art which conceals the art, so that the impression on the spectator is above all of admiration at a faithful and characteristic transcript of feature and of spirit; and this reflection of the "inner life" will be as deftly expressed by the arrangement of the hands as by that play of feature which present appliances enable us to portray.

"Expression is my strong point, "says the fashionable photographer—while one hand is engaged in support of a drooping head and there is an immediate notion that the subject's liver is in a disordered state, and thereby his brain is affected and needs careful nursing. Another one resorts to the "refuge for the destitute" by bidding his sitter put a hand in one pocket of the unmentionables, *and keep it there!*

To pose the hands without the photographic appendages may necessitate a greater artistic power on the part of the operator; but the gain is in a grace, a dignity, and a character which will repay all the study the acquirement of this power may demand.

ON VANITY.

By Frank M. Sutcliffe.

Some years ago my father painted the portrait of a cavalry officer, with his "war paint" on. In spite of repeated sittings the gallant soldier was not pleased with the picture. He said, in fact, that he did not think it was like him. One day he brought a brother officer to see the painting, who, as he left my father's studio, whispered—"His friends tell him he is the image of Prince Albert; you understand." My father took the hint, looked up some prints and engravings of the Prince, and added a dash of them to his painting. When the officer came again he was charmed with the picture, and took it away at once.

Photography, of course, is not capable of such handling, being only at its best "a *reflection* of a gutta-percha world in a brass door handle;" yet, by keeping our ears wide open we may often discover our sitters' little weaknesses, and so be able to give them portraits which will flatter their vanity.

◆

CHARACTERS WE HAVE MET.

By G. E. Latine.

The noble army of amateurs has already assumed colossal proportions and new recruits are being added daily to its ranks, so a glance at some of the various types composing it may not be entirely without interest.

First may be mentioned the amateur with a craze for plate-making. This individual has always got some startling intelligence to impart—"found out the very best process, don't you know!" He then proceeds to tell you how it is done. "You make the emulsion in the usual way," says he, "and then just before washing you add two and three-quarter grains of Eno's fruit salt to the pint of emulsion." This addition, according to him, bestows innumerable good qualities on the plate; but, unfortunately, nobody else finds any advantage in so doing.

Another of the same class is the man who tries every process under the sun for making plates. He precipitates, boils, stews, and even freezes his emulsion, but it is a strange fact that when he wants to take a photograph he uses a bought plate.

The conservative amateur is another well-known type. "None of your new-fangled notions for me," he says. "Away with your hydrokinone, sodium sulphite, sodium carbonate, and hydroxylamine. I intend to stick to the good old pyro., ammonia, and bromide;" and, in fact, he is more successful than the man who never developes two plates by the same formula, and rejoices in compounding fearful and wonderful developers containing a score of different ingredients, which he declares is perfection.

A few words about the careless type may not be out of place here. This individual rejoices in an absence of method. He opens a package of plates, and, the label having been torn off, omits to replace it while packing them up again. The consequence is that a week or two after he tries to take an instantaneous picture on a plate for which the average exposure is half-a-minute. If profanity were to have an accelerating effect the resulting negative would be perfection. He is also above labelling his bottles, and, as a natural consequence, we find him trying to develope a plate with equal parts of alum solution and mercury intensifier.

Another familiar object is the man with a pocket camera. This fiend in human shape delights in portraying his acquaintances in all sorts of ridiculous situations, and nothing pleases him better than to hand you a neat little print in which you recognise yourself in an attitude compared with which Mr. Muybridge's horses are elegance itself.

A class which is already too numerous is composed of the men who know not what developer they are using. They simply get two bottles of solution from the druggist, numbered one and two, and blindly use equal parts for every plate. If the result be satisfactory well and good; if not, then the plate gets the blame.

Again—but I am afraid that if I proceed to enumerate any further the Editor's patience will be exhausted, and I imagine he is getting his scissors ready; so, as he will doubtless have plenty of matter which is both more useful and entertaining than this desultory article, I will conclude.

IN MEMORIAM.

By Samuel Greenway.

Th' expiring year, receding into space,
Leads us its varied incidents to trace.
We estimate the losses we've sustained,
And credit them with benefits obtained.
This year our balance-sheet reveals too plain,
Our sacrifices far exceeds our gain.
Photography deplores the loss today
Of three distinguished patrons, passed away—
Men to whose skill, and energetic aim,
Our "Modern Art" 's indebted for its fame.
Whose deep researches and devoted aid
Can never be sufficiently repaid.
Two pioneered a fresh-discovered art,
And, e'er they died, disclosed each mystic part.
The other prematurely left behind
The vast productions of a cultured mind.
Death's sweeping sickle no distinction shows;
Its dreadful mission no retraction knows.
While gentle Spring revived the drooping scene,
It called the first to climates more serene.
When smiling May affirmed its right to reign,
Its fatal arrow thinned our ranks again.
But not appeased, for with relentless sway
While Summer waned it bore the third away.
Their great achievements make their names renowned;
Deserved success their ardent efforts crowned.
Science and Art can ill afford to lose
Such gifted men as Statham, Pritchard, Hughes.

HOW TO MAKE NOTES ON THE DARK SLIDE.

By J. Barker.

The plan of entering notes, with reference to exposed plates, &c., in a book is not always convenient, and in many instances it is preferable that the entry should be made upon the slide itself, removable at pleasure, and any other required entry made. Where the slides are brass bound this can be done to a certain extent by roughing the brass corners with a piece of fine glass paper. They can then be written upon with a piece of lead pencil, and a short note made upon the brass. All slides are, however, not brass bound, and the following plan will be found to meet most requirements:—

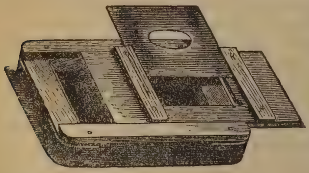
Make a solution or emulsion of gelatine 180 grains, kaolin thirty grains, bichromate of potass ten grains, water one ounce, and coat ordinary writing paper with the same. The paper should be damped and stretched on a flat surface before coating. When dry, cut into slips of the desired size, and paste or glue one strip to each side of the dark slide. These slips can be written upon with lead pencil, and the writing removed as often as required. If preferred, instead of using the coated paper a groove could be made in the side of the dark slide, and then filled up level with the emulsion; but the paper plan entirely obviates injury to the dark slide in any way. A piece of leather should be attached to the camera to hold the pencil, which will then always be at hand to make any desired note at the moment of exposure.

◆

SCOTCH HOTCH-POTCH.

By James McGhie.

Vignetting Frame.—The annexed diagram represents a vignetting frame simple in construction and most effective in use, and is due to the ingenuity of Mr. J. Terras, Markinch. It is an ordinary teak or oak printing-frame with a mahogany front, similar in construction to the cross and rising front of a camera. It is grooved into the two strips of wood at the sides, which are screwed permanently to the frame. The centre piece of wood should have the outside square, and a number of them can be made, with any desired shape or size of aperture, to fit into the same frame. The vignetter should be at least an inch above the negative, and, with an opening of $1\frac{1}{2} \times 1$ inch, will give the graduation required for an ordinary *carte* bust. Good vignettes may be secured in strong light or even in the sun by putting a piece of ground glass or gumming *papier mineral* over the opening. When required for ordinary printing the vignetter can be pulled out, and the frame used in the regular way.



Keeping Skylights Water-tight.—Perhaps among the photographer's many annoying vicissitudes few are more common than leaky studios; for, no matter how carefully the glazing may have been done, the first shower after a period of dry weather generally discovers crevices in the putty through which a process of unwelcome filtration takes place.

To those building or reglazing studios (especially with wood astragals), I would suggest this simple cure, for which I am indebted to Mr. Jamieson Beith, who assures me, after fifteen years' experience, that it is an infallible remedy. After giving the sashes one coat of paint fix the glass into the rabbets with half-inch sprigs, or flat pieces of metal such as glaziers use for plate glass. Procure some common unbleached cotton sheeting and tear it into suitable lengths an inch broad. To make it "corner" into the sash with facility, damp and fold it in two down the centre, using a hot, laundry smoothing-iron. Take thick paint, or, what is better, reduce white lead to a workable consistency with boiled linseed oil and a little turps. Coat the rabbet and (say) half-an-inch of the glass; lay the cotton on the wet paint, and press it well into the corner with an iron tool. Give it a coat on the top in the usual course, and when dry, if at all carefully done, it is quite unaffected by atmospheric changes, as it permits of a certain amount of expansion and contraction that putty does not possess.

A Waterproof Varnish—one which will give an impermeable and inert coating to wood, *papier-maché*, &c.—is a desideratum much required by those who prefer to make their own trays, baths, &c. From long experience the following can be recommended as possessing those qualities:—Take equal parts of india-rubber solution (made by dissolving raw rubber in benzole, or thinning down rubber paste to the consistency of a syrup with benzole or naphtha), and a brown spirit varnish known as "slake" (used by French polishers). They mix readily. This varnish, when of the proper consistency, flows smoothly and dries with a very hard, tough surface. It is almost unnecessary to say that the article should be thoroughly dry before being varnished; in fact, a slight heat both before and after coating is advisable. With some porous woods several applications may be required.

◆

EXAMINATIONS.

By Friese Greene.

As our profession is now so rapidly rising, and so many amateurs are joining our ranks with only a few months' experience, employers are often troubled with an assistant who in reality is no assistant at all; who, in many cases, obtains a situation by imposture, and stays, it may be, a month on trial, during which time a good assistant may be seeking a situation but is too honest to use the means to obtain one that his inferior brother-workman has done. It, therefore, shows the need of some means being taken to examine assistants as to their knowledge of the studio routine, from the production of the negative to the finished print, and to certify to their efficiency in one or other of these branches. Any man then knowing his wants might at once seek for or pick out the one most suited to his requirements.

The way I propose for this to be done is for a number of professional gentlemen to band themselves together to take a studio (which could be opened to sitters and so made self-supporting). This, with a good man and balance at the bank to make a favourable start, could be open to an assistant to go and display his skill and tact with a regulation number of sitters and receive a certificate in whichever class he was most perfect. The studio should be in a mixed neighbourhood, and the manager use the necessary care and foresight to ensure good work going out, which should be done at popular prices; and the candidates should be at liberty to use any formula or means with which they may be acquainted so long as the result is good.

If this were done the photographer who needed an operator for operating alone would be satisfied with one who held a good certificate for that branch even if he were unsuccessful in other divisions, and the same with the other branches. Of course the incompetent man who could not earn a certificate of any sort would be crowded out of the profession and left to turn his steps to pastures new.

◆

ART IN PHOTOGRAPHY.

By Richard Keene.

Much has been said on the relation of Photography to her elder sister, Art; and no doubt the controversy will still go on. There are quarrels in most families. Knowing, however, as we do the very great assistance Photography has been to her sister, and how Art has for some years been much more particular and truthful in her productions, let us see if Photography cannot reap some advantages in return from her more imaginative relative without pretending to the same dignity.

In the first place, then, we would have every photographer, before he thinks of optics or chemistry, learn as much as he can of drawing and composition and the wonderful effects of light and shade; for, without understanding these, neither artist nor photographer can hope to excel. The charm of colour must, I fear, be for ever shut out from his pictures, and there is little scope for the faculty of imagination, though there is much and ever-varying beauty in nature which he can capture on his magic plates if he have only the soul to see it; but, as Charles Kingsley says—"Without the appreciation of beauty there is no art."

I am doubtful if any good, in a pictorial or strictly art view of the matter, is to be got out of the so-called "instantaneous" exposures after which so many run mad. An express train taken at full speed looks very like one taken at rest, only not quite so good. Let the photographer, then, who is desirous of producing pictures add to his previous practice a study of engravings of the best works of the best painters, which will help him more than all in his selection and arrangement of subjects, as well as in choosing the time when they are best lighted, and upon which so much depends. How many views are spoilt through the neglect of these most essential rules of art, when an hour or two later or earlier would have made all the difference in the lighting, or the shifting of the camera or the proper placing of a figure would have made the composition all that could be desired! The artist can leave out or improve any unpleasing object which may come in his view; the photographer has only the power of selection, and can ignore nothing. Here comes in his art-knowledge to help him over the difficulty, or in making the best of it.

My incomplete remarks may be trite and commonplace to most, but I have thought them worth while repeating for the benefit of the many tyros who are taking up the camera, and in their eagerness are firing away haphazard at anything they see; also, for those of greater experience whose only ambition is a good, clean negative, regardless of everything pertaining to art.

ORLANDO BROWN'S PLATE-MAKING.—A LONG WAY AFTER JAMES RUSSELL LOWELL.

By Mark Oute.

Orlando Brown is a sensible man ;
He works and studies from morn till night,
Doing the best that ever he can
To produce good pictures in any light.
For Orlando B.
Says that he
Gets the gelatine plates to work speedily.
But Orlando thought they were much too dear,
As he read in the papers how little they cost;
So to make his own was the method clear
To get back again the money he'd lost.
Then Orlando B.
Went to see
What the price of apparatus for making would be.
He *totted* it up, and he laughed with glee,
As *on paper* he counted the saving, you know;
Then hurried homeward right merrily,
The truth of his calculations to show.
For Orlando B.
Had no "idee"
The trouble the things would give him, you see.
He blocks up the window and shuts out the light,
Then, for a medium "canary" he chose—
For spirits, the spirits of wine were right;
In the sombre shade like a ghost he goes.
"Orlando B.
Feels," says he,
"That he's getting well up in chemistry."
He boils and he stews over lamps and fires,
As he cooks his chemicals carefully;
But the gelatine swells beyond his desires,
And so at the start he gets fixed, does he.
For Orlando B.,
Don't you see,
Couldn't quite strike it off to a T.
At last the gelatine 'gan to flow,
And he felt his troubles were nearly o'er;
But fog setting in on *each* plate did show
That making of plates was an awful bore.
Orlando B.
Couldn't quite see,
With all this waste, where the saving would be.
Next lot the fog was gone—but, oh !
The image was thin and stained with marks;
A third batch he makes, which, testing—Hullo !
It floats off the plate in one of its larks.
Orlando B.
Said that he
Believed the gelatine came from the D——.
He watched all night, he tended all day—
In metaphor stewing himself all the while ;
He felt that, in *short*, his hair would be gray
If he laboured much longer this way to strike "ile."
Then Orlando B.
Whispered to me,
"I'll buy my plates after this, you'll see."

OUR PHOTOGRAPHIC SOCIETIES.

By H. Broadhurst.

It has often occurred to me how extremely difficult it is to anyone desirous of taking up photography to learn anything of the art if the person be not acquainted with someone who "dabbles" therein. This difficulty is to a great extent removed where there is a photographic society in the neighbourhood; but a perusal of the Almanac shows that such associations exist only in cities and towns of very large populations. With one very honourable exception all the societies are in towns with upwards of 40,000 inhabitants. Now, it appears to me that there must be some photographers in almost every town or village in the country who would be very much benefited if they could meet together to consider the progress of the art-science; to consult among themselves as to the many failures with which most amateurs are constantly being disheartened; and to argue the *pros.* and *cons.* of the various methods of development, toning, &c., and where papers may be read on photographic matters generally.

Having derived very much beneficial experience from one of these associations, I heartily recommend that amateurs in towns where the population is 10,000 or upwards should endeavour to organise societies of this kind, as I feel quite sure that it would be the means of increasing the ranks to a very large extent, and of educating, photographically, any who were members thereof.

At the time when we were meditating the establishment of a society in our town (which is much the smallest in the Almanac list), we were rather damped in our ardour by a letter we received from the secretary of a neighbouring society numbering 130 members, to whom we had written for information. His opinion was that in such a small town as ours we could not possibly succeed, and he mentioned several important places where such had been the case. However, we proceeded with our plans, and we have so far succeeded quite as well as we originally expected, whilst our prospects for the future are everything that could be wished for. For my own part I believe the failures which were mentioned to us were occasioned through a want of sociality generally, and a coldness towards the mere novices, which naturally would lead to want of interest at the meetings. We steadfastly resolved against any stiffness or formality at our meetings, and it is to this that I attribute our success.

Above all things do not despise the learners. Assist as much as possible those who are rather backward, and, by making them to feel that you are interested in their progress, urge them to "try, try again" until satisfaction is secured. I know of nothing which requires so much patience as photography; and it goes very hard with an amateur if he have not a friend that he can fly to in his troubles. By meeting together, even monthly, consulting with one another, and exhibiting specimens of work, it is wonderful how one aims at improvement which would not have been thought of but for such a stimulus. As, however, some amateurs are very shy at reporting their failures, it is a very good plan to have a question-box just outside the room door, wherein any member may drop a paper with queries thereon to be discussed at the meeting. At the meetings of our society we are all on such friendly terms that the most reticent member will not scruple to ask his question *viva voce*.

Of course it will be almost essential that the society should purchase the photographic journals, for without them it would be quite impossible to keep pace with the times; and, as every member might not be able to afford to take them in each for himself, it would thus be circulating ideas of progress where otherwise they might never reach.

Where such societies exist the boon to members is unmeasurable, provided, as I have said before, that ceremony and formality be not carried too far. I noticed in the annual report of one of the large societies that this stiffness was causing some little anxiety, and I feel sure it has a most prejudicial effect on the members generally. "Unity is strength," and "two heads are better than one," are maxims which every member of a society is morally bound to recognise, and when skill and determination work together in harmony improvement is certain to follow.

Let us hope that the roll of societies may be largely augmented ere another ALMANAC is published.

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LENS SHADES.

By R. MURRAY LAWES.

A FEW years back a correspondent in a contribution to the ALMANAC suggested the use of an old opera hat with the top removed as a means whereby to protect the lens from the solar rays. Being greatly in want of such an apparatus an old hat was sacrificed as an experiment, but I found the hat so much in my way in uncapping that I abandoned its use, and tried many other mechanical shades, which, though partially successful, increased the bulk of my load, and reflected light into the lens when in use.

At last the piece of cardboard covered with green baize (supplied by many makers to protect the camera) attracted my attention—a perfect non-reflector! So, having made a ring of strong elastic large enough to go right round the camera, I laid my baize card on the camera top, projecting sufficiently to shade the lens, and like pieces at the sides and bottom, placing the ring around them, thereby completely shading the aperture from direct rays at all times when the sun is moderately near the meridian, obtaining an effective shade with the sole addition to my gear of a piece of elastic.

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AN EXPERIENCE AND A WARNING.

By A. H. BOOL.

HAVING been a former contributor to your ALMANAC, I send you the following experience. If you think it worth insertion it may act as a warning. Some years ago we suddenly missed two silver medals that with four others (bronze) were in a glass case in the reception room. Several customers had been in during the day, but we could not suspect any individual. We gave notice to the police, who, we believe, warned the pawnbrokers around and made inquiries, but reported after a fortnight that they could hear nothing of them. We gave them up for lost, and reproached ourselves for not having taken better care of them.

About three months ago one of the men who work for the parish clearing the sewers and gullies called, and asked if we had ever lost anything. The medals were forgotten, and we replied in the negative. Then he mentioned medals, and their loss was at once brought to mind. He then produced them, saying that he had found them in a street gully near Victoria Station. They were black and dirty, but he had cleaned them, and, finding the names engraved on the rims, he brought them to us. We suitably rewarded him for his honesty, and were overjoyed at their recovery.

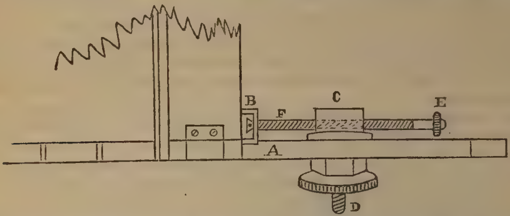
I can only suppose that the person who stole them was not an expert thief, and, finding the names on them, was afraid of pawning them; or he may have heard that the police were inquiring, and then put them down the street gully to get rid of them. Moral: Take care of your medals, as they might not come back so easy.

A SIMPLE, COARSE, AND FINE SCREW-FOCUSSING ARRANGEMENT FOR THE CAMERA.

By "Syntax."

The accompanying diagram so obviously demonstrates of what this little piece of mechanism consists that a description of it is scarcely needed.

By it, at a very trifling cost, any camera, with either a rigid or folding tailboard, may be fitted with a very simple but efficient focussing adjustment. One has only to take an ordinary clamping screw bolt, D, and solder on its flat top a block of brass, C, which has already been tapped and screwed to permit the leading screw, F, to pass through it. This screw rotates in a strap of brass, B, and is retained securely in its place by a pin through its extremity.



To use this arrangement: release the clamping nut, D, and by it pull the focussing-frame nearly into its desired position; then screw it up, and make the fine adjustment by turning the milled head, E.

EPITOME OF PROGRESS DURING 1884.

By the Editor.

THE PREPARATION OF PURE HYDROBROMIC ACID.

A continental chemist, M. Gruning, having found that the preparation of hydrobromic acid by the usual methods of distilling sulphuric acid and bromide of potassium or sodium always give an acid of indifferent quality, has devised a method in which pure phosphoric acid replaces the sulphuric acid. In a flask of about a pint capacity are placed three ounces of coarsely-powdered bromide of potassium, and five and a-half ounces of phosphoric acid of 1·304 specific gravity. A spirit lamp or Bunsen burner will supply sufficient heat to cause the acid to distil over. The first part of the distillate may contain hydrochloric acid from the presence of chloride in the salt, and in this case must be rejected.

MOUNTING LARGE PHOTOGRAPHS.

Messrs. Robinson and Thompson describe the following method of working:—If large photographs are mounted *damp* and with starch the expansion and contraction are so great that the mount is "cockled." The correct principle is to mount the print as dry as possible. First have the prints in a pile, nicely damp, and flat. Glue with fine, clear Russian glue and a flat hog's-hair brush, and spread each print out face down to dry. When dried they may be trimmed and kept any time until required for mounting. To mount: have about twelve half-sheets of thick blotting paper. Place two dry sheets at the bottom, then one well-damped sheet next; lay (say) twelve photographs on this sheet in a pile, and place another damp sheet on the pile. Have one more damp sheet above, and then the rest of the dry sheets. Now take out the top photograph and place it between the two top damp sheets. This is merely to take the hardness out, and the print must not remain long enough to allow expansion. Take it out (putting the top one of the pile in its place), and place it on the top dry sheet. Now sponge it all over with a fine sponge from the middle to the ends, taking care to wet it all over; it must be merely damped, and with as little use of water as possible. Take it up and lay deftly in its place on the mount, smoothing it out from the centre of the print; now take a sheet of paper and a handkerchief, and rub it down from the centre to the edges. It is better to have a flat burnisher at hand to smooth any unevenness. If the print have been nicely mounted and with no unnecessary damping it will soon dry, and, even if only in a paper book, the "cockling" will not be much. The glueing must be thin and even—something of the nature of the gum on a postage stamp. The sheets of blotting-paper will require re-damping if a number of photographs pass through, and it is not well to wet too many on the top sheet without changing it, as the paper is apt to fray up, and small pieces will then stick to the glue and make the finished picture uneven. Keep a basin of clean water on the table and a plate for the sponge.

INTENSIFYING AND CLEARING GELATINE NEGATIVES.

The following is Mr. Alexander Mackie's method, described in the pages of The British Journal of Photography:—The negative, having been developed with alkaline pyro. and fixed, is taken out of the hypo. bath. Before washing, a judgment is formed as to whether it is too dense, dense enough, or too thin. In the first case it is washed and reduced by any approved method. In the other cases it is immersed in a bath of—

Protosulphate of iron	3 ounces.
Chrome alum	½ ounce.
Water	20 ounces.

Here it may remain a considerable time without injury; but the action will be complete in a very few minutes, and will be found to be similar to that of the acid and alum bath generally used for decolourising and clearing the film, with this important difference—that the deposit will have gained, instead of lost, density. It may happen that it is now too dense; but this is a difficulty very easily overcome by flowing over or immersing it in a weak acid solution. I use hydrochloric acid—about six drops to the ounce of water. At this strength it will be well under control, and yet be a sufficiently-active reducer. If the negative should not have gained sufficient density in the iron bath it will, after a thorough washing, be in a more favourable condition for being acted upon by any method of intensification that I have yet experimented with than if the iron treatment had been omitted; but I have nearly always found it quite sufficient to treat it with a simple solution of bichloride of mercury in water. It is advisable to use this very weak to start with, especially if only a slight increase of density be desired. The resulting negative will have exactly the colour and appearance of a wet-plate negative intensified with pyro. and silver. If it require still more density it may be blackened with a solution of cyanide of silver, as in the late Dr. Monckhoven's method; but this will rarely be required. The iron solution, if used over and over again, will, of course, in time contain a considerable quantity of fixing solution; but I do not find that this affects its action in any way. The iron solution should not be allowed to come in contact with the film until the developer has been washed out of it, or an inky stain will result. The fixing bath, however, seems to secure this, either by simple washing or by some chemical action.

A DISCONTINUOUS THERMOMETER.

Mr. J. J. Coleman has devised an instrument to which he has given the above name. It consists of a series of tube bottles arranged in a row in a wooden frame, the liquid contents of which become frozen successively as the temperature is lowered, commencing with an olefine (paraffine), solidifying at 100° Fahr., the series consisting of olefines until 32° is reached, when it is continued to 40° below zero with mixtures of glycerine and water.

COMPARATIVE EXPERIMENTS WITH NON-CONDUCTING MATERIALS.

For many purposes it is very desirable to possess a substance which, applied to vessels or tubes, should be as impermeable as possible to heat, and an interesting addition to our knowledge on the subject has been made in a communication to the Philosophical Society of Glasgow. In a room heated to 100° Fahr. were placed a number of boxes containing ice, and of about a foot cubical capacity, first arranged in a tin box, allowing four inches of space all round, and then packed with the various materials. A second series were placed in a room of 60° Fahr. temperature, and the following results were obtained, the numbers indicating the amount of ice melted in a given time:—

Room at a Temperature of 100° Fahr.

1 Silicate cotton	100
2 Cotton wool	122
3 Sheep's wool	136
4 Infusorial earth	136
5 Wood charcoal	160
6 Sawdust	163

Temperature of Room 60° Fahr.

1 Silicate cotton	100
2 Hair felt	117
3 Wood charcoal	120
4 Wood shavings	125
5 Gasworks' breeze (coke dust)	230
6 Air spaces of 1 in. alternated with wood 1 in.	280

A box well packed with silicate cotton, after the manner of a Norwegian cooking stove, would form a very easy mode of cooking emulsion, without the aid of extra heat and its attendant necessity of care and watchfulness.

REMOVING BICHROMATE STAINS.

THE following plan is given in a trade journal:—If a small quantity of sulphuric acid be added to a strong solution of hyposulphite of soda, and applied to the skin, the stain can be quickly removed; or the same effect can be obtained by the use of a little sulphurous acid, and afterwards washing in rain or distilled water.

STRIPPING ALBUMEN FILMS FROM PAPER.

A CORRESPONDENT of the *Photographic Times* (New York) gives a method of removing the albumen film from a sheet of paper that, if successful, may turn out to have a considerable sphere of usefulness. The plan simply consists in soaking the print in a saturated solution of borax, when the film becomes loosened and may be stripped off.

PRESERVING THE MOUNTING SOLUTION.

A CORRESPONDENT of THE BRITISH JOURNAL OF PHOTOGRAPHY, dating from Bombay, writes as follows:—I mount my prints with the solution of gelatine and alcohol given in your ALMANAC. I found that here, in India, it went bad in a week. I have been in the habit of using boro-glyceride to keep meat and milk fresh, and I find one teaspoonful of boro-glyceride will keep a pint of milk sweet for quite a week. I, therefore, in making up my mounting solution, put a small egg-spoonful into the solution of about three ounces. I made up a bottle of solution in October, 1883, and when I had occasion to use it a few days ago it was perfectly good and sweet. Perhaps this boro-glyceride may be a useful addition—not only to the mounting solution but also to albumenised paper, and, may be, to emulsion.

DETECTING AND ESTIMATING THE HALOIDS.

THE following is the outline of a method recently described by Mr. F. Maxwell Lyte in the *Chemical News*:—The haloids having been precipitated together with silver, the precipitate is to be collected, dried, and weighed. It is now dissolved in about thirty or forty times its weight of water by the addition of the least possible quantity of cyanide of potassium. A quantity of pure bromide of potassium is now added, which need not be above the weight of the precipitate. The cyanide is now decomposed by the addition of an excess of dilute sulphuric acid. The precipitate in which any silver chloride has become, by this means, converted into silver bromide is now collected in a filter, dried, and weighed. It is once more dissolved in the least possible quantity of cyanide of potassium in the same quantity of water, and to this is now added one and a-quarter time the original weight of the precipitate of potassium iodide. The cyanide is now again decomposed by dilute sulphuric acid, and the precipitate once more collected in a filter, dried, and weighed. In the last precipitate all the silver is converted into iodide, excepting such as was iodide already. In the second all became bromide excepting such as was bromide or iodide already. From the weights thus obtained from the first, second, and third weighings the chlorine, bromine, and iodine can easily be calculated.

A SECOND method of detecting the different haloids in the presence of one another is given by Mr. Francis Jones in the same journal. He says:—Place a *small* quantity of the mixture to be tested in a good-sized test tube, and add a few pieces of manganese dioxide; then a little water. Add now *one* drop only of dilute sulphuric acid (one part of acid to ten of water). A brown tinge indicates the presence of iodine. Boil the mixture and confirm the presence of iodine by the violet vapours in the upper part of the tube. Continue the boiling until these vapours cease to appear.

then add another drop of sulphuric acid, and boil again until they cease. If necessary, repeat this addition of acid and boiling until violet vapours have entirely ceased. Now add about two cubic centimetres of the dilute acid, and boil again. Brown vapours indicate bromine. Continue the boiling until the vapours no longer smell of bromine; then add one cubic centimetre of dilute acid, and boil again. When the vapours no longer smell of bromine allow the residue to cool *completely:* add an equal bulk of *strong* sulphuric acid, and warm. A green gas bleaching a piece of moist red blotting-paper at the mouth of the tube indicates chlorine. Occasionally some bromine comes off in the addition of the strong acid; but, if so, it is soon got rid of, and is succeeded by the chlorine, which is chiefly evolved in warming the mixture. As, moreover, moist red blotting-paper is far more quickly acted on by chlorine than by bromine, there can be no difficulty in distinguishing between the two elements.

STILL another method of separating iodine from the other haloids is published by Herr A. Cavazzi, in the *Chemiker Zeitung.* Ferric chloride, it is known, will liberate iodine and bromine when present in a mixture of the three haloids, and Herr Cavazzi finds that ferric sulphate will separate the iodine alone. It must be free from acid for the purpose, and to make it so he heats the salt to redness. It is then rather insoluble; but by adding from five to ten per cent. of ferrous sulphate the solubility is so increased as to enable water to take up a twelfth of its weight. When a mixture of iodine, bromine, and chlorine is boiled in this solution the iodine is driven out. It can be absorbed by potash, and the iodate thus formed reduced to iodide, which he is enabled to do by the hydrogen evolved by adding aluminium. Precipitation by silver nitrate in the usual way enables the amount to be estimated with exactitude.

FINALLY: a writer in the *English Mechanic,* Mr. Henry T. Jones, gives the following method of detecting iodine and bromine in combination. He says:—When chlorine or chlorine water is added to a soluble iodide in the presence of starch or dextrine, the well-known violet-coloured iodide of starch is produced, this compound being destroyed by excess of chlorine, owing to the formation of chloride of iodine. A solution of bleaching powder or of sodium hypochlorite behaves in a similar manner when substituted for the chlorine or chlorine water. When chlorine or chlorine water is added to a soluble bromide in the presence of starch or dextrine a yellowish-brown or brown colouration is produced, according to the amount of bromide present or to the state of its dilution. This colour is not so easily destroyed by excess of chlorine. With a solution of bleaching powder or of sodium hypochlorite no colouration is produced until an acid (in most cases dilute sulphuric acid is preferable) has been added, when we get the ordinary colouration due to bromide. Upon this fact depends the following simple test for the detection of a bromide in the presence of an iodide:—To the solution containing an iodide and a bromide starch or dextrine is added, and then a drop or two of solution of bleaching powder or of sodium hypochlorite, when the violet colour indicating the iodide appears. Sufficient hypochlorite solution is now added carefully to produce the chloride of iodine, or until the blue colour disappears. Then, on the addition of dilute sulphuric acid, the brown colour indicating the bromide is at once brought out. The bromide reaction is by no means so delicate as that of the iodide, but from experiments made it was found possible to detect $\frac{1}{50}$th of a grain of bromide of potassium when mixed with $\frac{1}{100}$th of a grain of iodide of potassium in a concentrated solution, and $\frac{1}{5}$th of a grain of the bromide in the presence of $\frac{1}{10}$th of a grain of iodide when dissolved in one fluid ounce of water.

PURIFYING SHELLAC.

THE following are the details of M. E. L. Aude's mode of refining shellac:—Three and a-quarter pounds of soda are dissolved in nine and a-half gallons of water contained in a small boiler or kettle. Eleven pounds of crude shellac are added in small quantities at a time, giving a turbid solution possessing the characteristic odour of shellac and a violet-red colour. The liquid is boiled for a few minutes, and, while hot, a wooden air-tight cover is cemented on the vessel. When the liquid is quite cold the cover is removed, and the thin cake of fat which is found on the surface is separated. The solution is filtered through linen, the clear filtrate slowly decomposed with dilute sulphuric acid, and the resulting precipitate washed with water till no acid reaction remains. The washed resin is now pressed and melted in boiling water, when it can be shaped with the fingers. This shellac is cooled in water containing glycerol, and, when hard, is dried. The refined shellac forms yellowish-white, glistening tufts, which, when dry, are yellowish-brown. It should entirely dissolve in alcohol.

CLEARING AND REDUCING NEGATIVES.

WRITING on this subject Mr. Alfred E. Dighton says, in THE BRITISH JOURNAL OF PHOTOGRAPHY:—I have a pet mixture for reducing negatives which I have used for the last two years, and find it all that can be desired:—Take a one-ounce empty pyro. bottle, nearly fill it with Edwards's intensifier, and drop three biggish lumps of cyanide into it. When the cyanide has dissolved get another one-ounce pyro. bottle, half fill it with the above, and three parts fill the bottle with water. The negative to be reduced must first be put into the alum bath for a few minutes to prevent frilling, and then washed and watched attentively while in the reducer, as a minute or two will be sufficient. The reason more water is added to the mixture after the cyanide is dissolved is because it acts as an intensifier until some of the effect of the mercury and iodide is counteracted by dilution; so one can readily tell how much water to add, it being most wise to add a little at a time until it is found that it reduces as desired. When it has been got right it will reduce a number of negatives, and simply wants strengthening now and then from the strong solution. Should any person, through carelessness, reduce it too much, it can be very greatly strengthened by simply washing and leaving it in the hypo. bath for some time.

A SUBSTITUTE FOR GLASS.

THIS method of rendering paper transparent and suitable for use, as a substitute for glass, has been patented in this country. This paper is first extended on a frame or other arrangement, according to the size of the plate or surface which is desired. After it is dry the surface is covered in any convenient manner with a fine varnish or composition, such as copal varnish, for the purpose of rendering the fabric transparent; it is then dried, and after it is quite dry the surface is rendered smooth by the application of powdered pumice stone or other suitable material, or it may be smoothed by suitable machinery. This process of smoothing may be repeated, if necessary, two or three times until the surface or plate is smooth or transparent. The surface so prepared is then covered on one or both sides with a solution of gelatine, isinglass, or other substance possessing similar properties, and allowed to dry. The surface so prepared may, if desired, be further treated with a preparation of ox-gall, from which the fatty matter has been extracted by acetate of alumina or similarly-acting agents which will precipitate the fat of the gall, the resulting preparation being then passed through a filter, whereby a clear solution will be obtained, with which the plate or surface may be covered so as to secure the safe reception of the emulsion for photo graphic or other use. Instead of ox-gall any similarly-acting substance or material may be used.

CEMENT FOR GLASS AND BRASS.

THE following formula is recommended as a cement for fastening together articles of brass and glass:—One part of caustic soda, three parts of resin, and five parts of water, and then kneaded into half the usual quantity of plaster of Paris. The cement will stand heat very well, and hardens in from one-half to three-quarters of an hour. If zinc white be substituted for the plaster of Paris the hardening will be slower.

LABELS FOR METAL AND GLASS.

FOR glass bottles a solution of chrome alum and gelatine is, perhaps, as good a damp-resisting mountant as any. Metal always presents difficulty, especially when exposed to damp; but, according to a foreign contemporary, it can be overcome by the use of albumen for the purpose. White of egg well beaten up is diluted with its own bulk of water and applied with a brush to the surface to be united; and then, before it is dry, a hot iron is passed over the paper so as to coagulate the albumen. It is also suggested that, by means of successive layers of paper and albumen, waterproof boxes, &c., may be formed.

HERR NICKEL'S LICHTPAUS PROCESS.

HERR NICKEL, of Chemnitz, has patented in Germany a lichtpaus (or ferro-prussiate) process, which is thus described:—The process is intended to reproduce by lichtpaus, in blue lines on a white ground, any kind of a drawing by using the well-known lichtpaus paper, which is sensitised by treatment with citrate of iron, ammonia, and red prussiate of potash. The process is based upon the production of a negative copy of the drawing to be multiplied, by using as follows a special lichtpaus fluid:—Take some filtered gum arabic and mix it with acetic acid, in order to render it fluid and prevent it from spoiling; then add a little dissolved soap, in order that the lines drawn by this mixture may not be brittle when dry. Add Indian ink to this mixture until a drawing made with it is quite visible. Make a copy in the usual way, with this ink, of the drawing to be copied, drawing upon the rough side of the ordinary paper. Then with the finger rub upon the same side of the copy as much common, soft, black chalk as the paper will take on. The chalk had better be previously pulverised. When all that has been done the drawing is laid in water and then carefully rinsed. By this means the whole of the lines drawn with lichtpaus ink dissolve out and disappear, leaving the drawing in sharp, white lines upon a black ground. If this negative copy is to be often used, it is recommended that it should be fixed by brushing it over with a broad hair-pencil dipped in spirit varnish, or by coating it with a solution of gum arabic to prevent the black chalk from spreading over the white lines. When such a negative has been made one may proceed to throw off an unlimited number of lichtpaus pictures by means of the sensitive blue lichtpaus paper, which gives blue lines on a white ground, by which a further carrying out of the lichtpaus by means of colours is facilitated.

RESTORING FADED PRINTS.

FOR the benefit of those who may not know how to proceed under the circumstances, the following instructions from a leading article in THE BRITISH JOURNAL OF PHOTOGRAPHY, on the restoration of faded prints, may have interest. The writer says:—Although at the present time there is no known means of actually restoring the image when once it has disappeared, yet there is a method by which faded paper prints may often be very much improved if not actually restored. In our article on *Old Prints* we mentioned that if the strong yellow tint in some of the very old photographs shown at the South London Photographic Society's last meeting were removed, a bold, vigorous picture would remain. Now, this is precisely what is accomplished by the method to be described. It may here be mentioned that the plan was first published by Mr. R. F. Barnes nearly thirty years ago. The treatment is simple. It is only to immerse the yellowed print in a dilute solution of bichloride of mercury until all the yellowness disappears. It is then well washed in water to remove the mercurial salt. If the print be a mounted one it is by no means necessary to unmount it previous to treatment. All that is required in this case is to keep it in intimate contact for a time with blotting-paper charged with the bichloride; indeed, this is the plan originally suggested by Mr. Barnes. By the bichloride treatment no lost detail is actually restored, as some have imagined. It is simply that the sickly yellow colour which, as it were, buried the delicate half tints, or what remains of them, is removed, and thus renders the picture bright and clear. Pictures which have been treated with the mercury always possess a much warmer tone than they did originally, as the purple or black tones give way to a reddish-brown or reddish-purple—more or less bright according, probably, as gold or sulphur had been the principal toning agent.

IMITATION GROUND GLASS FOR THE STUDIO.

In the *Deutsche Photographen Zeitung*, Herr Schlechter, of Carlsruhe, suggests a simple plan for obscuring the glass of the studio, which he has seen used by gardeners for keeping off the too bright light of the summer sun from the contents of their greenhouses. He tried it on his glass-house and found that it answered very well. Some glass-houses, where the roof or sides require to be as transparent as they can be made in winter, require to be obscured at least during the height of summer; for this purpose many persons paste thin tissue paper upon the panes, and others get a house-painter to paint them. Herr Schlechter's plan is to pound down some chalk and mix it with milk to any desired consistency, and then apply the mixture with a large, flat brush. One coat would last the whole summer and be extremely cheap. The idea is very good, and the present writer has seen something similar successfully carried out. In this case the coat of obscuring mixture was applied outside the glass instead of inside, and consisted of buttermilk and whiting laid on with a white-washing brush—outside the glass roof of a factory. The reason why it was put outside was obviously to save the great expense of erecting the high scaffolding that would have been required had the inside of the glass been coated or had blinds been put up. There was the further advantage that no trouble had to be taken to remove the whiting, as the sun and rain had effectually removed it before the dark days of winter set in; but, of course, as the photographer would need all the light he could get in winter, he might give the weather a helping hand in the removal, with advantage as regards the appearance of his premises.

A PROTECTIVE COATING FOR PRINTS.

Dr. E. Liesegang recommends as a coating for collodio-chloride or other prints a decoction of the seeds of *Psyllium*, or common fleawort. He says:—A quantity of this seed is covered with ten or twelve times its volume of cold water, and, after standing for a day, interrupted by occasional shaking, the liquid is filtered, a small quantity of methylated spirits being added. Those who prefer to mount the prints when dry may add some glycerine. After washing, the prints are soaked in this fluid for a few minutes and dried. Even prints made on paper prepared with soluble gelatine may, after this bath, be treated like ordinary albumen prints without the collodion film breaking. If it be desired to give the prints a coating of varnish I find a solution of one pound of copal in two pounds of linseed oil gives a splendid and most resisting covering, if applied with a pad of cotton or a brush. Prints treated in this way may be considered as permanent—neither light, air, nor humidity having the least influence upon them.

KLIC'S PROCESS OF PHOTO-ENGRAVING.

THE following are said by Major Volkmer to be, generally, the details of Klic's process of engraving, the results of which have been so much admired:—An ordinary negative—such as can be used for printing from upon albumenised paper—is taken, and a positive upon glass printed from it by means of carbon tissue, consisting of very soluble gelatine with a rich addition of sugar (in order that the picture may not be in high relief) and fine lampblack. This positive upon glass may easily be retouched either with lead pencil or neutral-coloured ink. A negative picture, exhibiting a delicate relief, is then produced from the positive matrix upon a copper plate (rolled copper) having a granularity produced by asphalte powder, and which is also prepared with very soluble gelatine, sugar, and lampblack, but which also contains a suitable addition of carbonate of magnesia and albumen. This picture, in delicate relief, is then etched into the copper plate by means of a rather concentrated solution of chloride of iron. The iron chloride first hardens the gelatinous film; but at last the etching solution gradually penetrates through that film to the copper, the metal being, more or less, attacked according to the degree of relief at which the gelatine film stands out at different places. After this first etching the gelatine picture and asphalte granules are both removed from the plate, which then shows but a flat and monotonous picture; but second, third, or even more subsequent etchings bring it up to the desired power and depth. Preparatory to this supplementary etching the surface of the plate is protected by a smooth leather roller, saturated with some fatty, acid-resisting ink, being passed across it, and then warmed in order to close the particles of colour. The most delicate tones take on the ink, and those beyond, which require to be further etched, remain open and may be acted upon for a minute or two by the etching medium. On repeating this procedure the quantity of colour taken up by the roller and the amount of pressure with which it is applied to the surface of the plate are increased, and the time of etching may be doubled. A third or fourth coating of ink is applied, so that only the deepest shadows shall remain open, and these may be etched three or four minutes, The negative from which the particular picture shown was done was taken by Herr Luckhardt.

IMITATION OPALS.

THE following methods for producing surfaces to imitate opal glass are given in THE BRITISH JOURNAL OF PHOTOGRAPHY:—Dissolve separately in hot water one ounce of sulphate of zinc and one ounce and a-half of nitrate of barium. Mix the two solutions and allow the precipitate to settle; decant the supernatant liquid, wash the sulphate of barium in two or three changes of hot water, and then transfer to a piece of fine calico placed in a funnel to drain. Now take a sheet of ground glass and place a teaspoonful of the pasty mass on its centre and proceed to grind it, using as a muller a smaller piece of glass cemented to a wooden handle. When this is found to be fine enough it is incorporated with a warm twenty-grain solution of gelatine, and the mixture is then passed through several thicknesses of cambric to remove the coarser particles. This method is, as we have said, a troublesome one, if an extremely fine result be required, for which reason we prefer to proceed by double decomposition. Take one ounce of gelatine, one ounce of barium nitrate, and ten ounces of water; dissolve the barium salt in the water by heat, and then add the gelatine, previously swelled, and dissolve. In another vessel dissolve 300 grains of zinc sulphate in five ounces of water, and pour, with constant stirring, into the gelatine solution, just as in making a gelatino-bromide emulsion. After keeping the resulting emulsion liquid for four or five hours it is poured into a dish to set, and is then washed free of the zinc nitrate in the ordinary manner, after which it is ready for application to the glass. Either of these emulsions may be slightly tinted to obtain a closer imitation of opal glass, different samples of which vary from bluish to pink and cream colour; but great care must be taken not to overdo this. An alternative method of tinting will be referred to further on. A third method which, in some respects, we prefer, differs materially in the details of its manipulation, though the resulting film is identical with those produced by the plans already described. The main difference consists in the formation of the barium sulphate by a process analogous to the sensitising of a wet plate, instead of by double decomposition in the vehicle itself. For this purpose take one ounce of gelatine, one ounce of barium nitrate, four ounces of glycerine, and ten ounces of water. Dissolve the barium salt in the mixed glycerine and water with heat, and then add the gelatine previously swelled. Dissolve and filter carefully. This solution is applied in the same manner as the emulsions previously described, and allowed to set thoroughly. The purpose of the glycerine is to permit the film to set hard—that is, for some time—without the barium nitrate crystallising at the edges and elsewhere, and thus causing irregularity. When used in the proportions given it enables the film to be kept for some hours, if necessary, in a warm, dry place without crystallisation, during which time a great portion of the original water will have evaporated. The next operation is to immerse the plate in a saturated solution of alum for from five minutes to half-an-hour, according to the thickness of the gelatine. This serves the double purpose of forming the barium sulphate by double decomposition and of hardening or rendering insoluble the gelatine. The plate must be immersed in the solution in such a manner that the latter flows over its surface in an even wave, a flat brush or a tuft of wet cotton-wool being passed gently over the surface to remove air-bubbles. After a sufficient immersion in the alum bath the plate is again washed and left to soak for half-an-hour, when it is ready for drying. The emulsions made in this manner may be applied to the glass as a substratum before coating with gelatino-bromide or chloride, which, of course, necessitates the preparation of the plates by the operator himself; or they may be applied after the development of the image, in which case commercial plates are available. In the one instance an unreversed image will be obtained by contact printing, and in the other a reversed. This latter is of no consequence in enlarging, as the negative may be reversed, but the fact should be borne in mind.

REDUCING NEGATIVES BY MEANS OF ALCOHOL.

A CORRESPONDENT from Wanganui, New Zealand, Mr. W. J. Harding, gives the following method of reducing over-dense negatives. He says:—"I find by practice that a gelatine unvarnished negative, when dry, may be reduced to any extent, either all over or in any part, by rubbing it with a piece of rag wetted with methylated spirits. The rag becomes black as if with india-ink. I now reduce the over-intense iron roofs of buildings in that way, and am very pleased with the result."

TRACING DESIGNS ON GLASS FOR THE LANTERN.

THE following plan for producing traced designs and diagrams upon glass for use in the lantern is recommended by Mr. W. B. Woodbury. It consists simply in the employment of a varnish composed of dammar in benzole or chloroform, to which a few drops of india-rubber solution have been added. After an hour's drying it was ready for use. With a fine lithographic pen dipped in india-ink the finest drawing can be executed. Mr. Woodbury goes on to say:—"I have myself written my name in full, 'Walter Bentley Woodbury,' in the diameter of a fourpenny piece; and by means of a small piece of damped card attached temporarily have, by the aid of drawing instruments, made some fifty circles in the space of a couple of inches. The advantages are that the glass is perfectly transparent, and even under a high power the lines show no sign of raggedness."

COLOURING BRASS WORK.

The *English Mechanic* gives the following recipes for colouring brass:—A black such as is used for diaphragms may be imparted by dipping in or painting with a mixed solution of chloride of platinum and nitrate of tin. The Japanese use for bronzing a boiling mixture of sulphate of copper, alum, and verdigris. Success in bronzing depends upon the temperature of the solution and the article to be coloured. Steel colour is produced by a boiling solution of chloride of arsenic, while a concentrated solution of sulphide of sodium gives a blue colour. A brown colour is developed by keeping the object in moistened sand for some time; another shade of brown by immersion in a solution of nitrate or chloride of iron, and an olive-green by a mixed solution of chloride of arsenic and iron.

TO STRIP GELATINE NEGATIVE FILMS.

In the *Bulletin de la Société Française* M. Bory recommends dipping the plate bearing the negative to be stripped into a very weak solution (say 1 to 50 to 500) of fluoric acid, washing well first in spring water, and then in distilled water. To prevent expansion of the film he recommends hardening it in alum for several hours. He finds that in stripping negatives in this way retouch in lead pencil is not injured by the washing. In order to get the gelatine film free it should be gradually removed from the glass while in the alum bath after it begins to come off and to dry. He also recommends a dilute solution of fluoric acid for cleaning glass bottles and other vessels. The best cures for injuries caused by fluoric acid are, he says, aqueous solutions of ammonia or borax. Fluoric acid is generally considered rather a troublesome and dangerous substance for unskilled persons to meddle with, though that objection may not be valid for such very dilute solutions as that mentioned by M. Bory. This is simply the process devised by Mr. Plener two or three years ago.

THE DEVELOPMENT OF INTERIORS.

The following modification of development is advocated by Mr. H. Y. E. Cotesworth for interiors. He says:—"My plan is to weaken the developer all round—that is, in all its constituents—but especially in regard to the pyro. and bromide. The result is a slower and more gradual development and the production of an extremely-thin image which is incapable of passing a certain point in density. We are thus able, by continuing the action of this weak solution, to bring out the finer details without giving undue density to the lights; in fact, we form a thin, delicate image complete in all its detail, but devoid of all density. Up to this stage the effect of the treatment has been merely to keep back the density of the lights, without, however, destroying their power of taking on density under more vigorous treatment. Let it be observed that, though I speak of the developer as a 'weak solution,' its weakness as a developer is confined to its inability to give density; its power of producing detail is great in consequence of the pyro. and bromide having been reduced to a greater extent than the ammonia. It is, in fact, if I may use the expression, an energetic developer restrained by simple dilution instead of bromide. At this stage the thin image produced is capable of intensification or modification in any desired manner. The original effect of light remains nearly unchanged, and under a more robust system of treatment the high lights possess the property of acquiring density more rapidly than the less strongly impressed half-tones and shadows. All that is necessary, then, is to judge the amount of additional density required by the different portions, and to convert the developer in a well-restrained, density-giving one; in other words, to add more pyro. and bromide freely and ammonia more sparingly, until the desired effect is gained. Every portion of the already-developed image acquires greater density, but this occurs in direct proportion to the original action of light; and so any degree of contrast may be secured by suitably modifying the treatment. With regard to the modification of the first development: this will, no doubt, vary with different descriptions of plates; but as a guide I will mention the proportions I have found to answer under my own circumstances. The plates I employ require for ordinary treatment three grains of pyro. solution, to two ounces of which I add, to commence development, under *ordinary* circumstances, equivalent to one-tenth of a grain of bromide and two minims of strong ammonia. In the modified development I reduce the pyro. to one-sixth, the bromide to one-third, and the ammonia to two-thirds. Or, to put it in a tabular form, I use—

Pyro.	1	grain.
Bromide	$\frac{1}{30}$	,,
Ammonia	$\frac{2}{3}$	minim.
Water	2	ounces.

In addition to the greater harmony between lights and shadows produced by this treatment, the effect is similar to a great increase in exposure, owing to the larger amount of detail it is possible to get out before intensification.

TO PREPARE ISOCHROMATIC PLATES.

Dr. Lohse, of Potsdam, has succeeded in producing "isochromatic" plates, for the reproduction of colours in their natural gradations, by treating the films with coloured solutions instead of by combining the dye with the emulsion. He takes an ordinary gelatino-bromide of silver plate and plunges it into a bath of eosine rendered alkaline by ammonia. The effect obtained depends upon the concentration of the solution of eosine. If the maximum of sensitiveness for the yellow be required it is obtained in mixing—

Water	100	parts.
Eosine	3	,,
Ammonia	10	,,

The quantity of eosine which the gelatine absorbs is very small, nevertheless its action is very powerful. By employing curcuma instead of eosine better results can be obtained, as the plates are not only sensible to the yellow rays, but all the rays of the spectrum, from the violet to the yellow, have an influence upon the plate. If it be necessary that the yellow should have a predominant action upon the prepared surface it would be probably better to employ a mixture of eosine and curcuma in the solutions.

TO TEST THE PURITY OF INDIA-RUBBER.

According to a paragraph in *La Nature*, the purity of india-rubber—an all-important point as regards its suitability for dissolving in benzole, &c., for mounting and other purposes—may be ascertained by placing it in a jar of water. If pure it will float, but if adulterated with foreign matter it will sink. Pure rubber also resists the action of all liquid acids.

TO MAKE A CLEAR ALCOHOLIC SOLUTION OF SHELLAC.

Where it is desired to obtain a clear alcoholic solution of lac it may be made by adding to the alcohol one-fourth of its bulk of petroleum spirit, frequently shaking for an hour or two till dissolved. Two layers of liquid will form after a time, and they can be readily separated from one another by means of a syphon or a separating funnel. The upper layer of liquid is the petroleum spirit with the wax dissolved, while the lower is the resinous constituent dissolved in alcohol. A similar effect is obtained by first shaking the shellac up with warm petroleum spirit before dissolving in spirit. The shellac has to be coarsely powdered for the purpose, and a troublesome task it is to perform Those who wish to try it can, however, by powdered shellac, which is largely used for pyrotechnical purposes.

A TONING BATH FOR COLLODIO-CHLORIDE PRINTS.

Dr. Liesegang gives the following in the *Archiv*:—A solution of acetate of soda in water, to which a little dilute solution of chloride of gold is added just before toning, is an excellent toning bath for collodio-chloride of silver prints. It is not advisable to prepare at first a bath containing one gramme of chloride of gold to one or two litres of water, as in a few days its toning power would suffer, and one would be constrained to add fresh gold solution. It is economical not to add more gold to the bath than is required to colour the number of prints to be toned. It is, therefore, recommended to prepare two solutions—one containing thirty grammes of twice-dissolved acetate of soda in one litre of water, the other containing one gramme of brown chloride of gold in three-quarters of a litre of water. The first of these solutions is intended for constant use, and is to have a certain quantity of the gold solution added to it before each time of using. The excess of gold, which in time falls to the bottom of the bottle, is allowed to remain there until a quantity sufficient to make it worth while to redissolve has collected. In this way there is extremely little gold actually lost. The gold solution itself does not precipitate any gold, and, like the soda solution, keeps an unlimited time. About an hour before beginning to tone a quantity of gold solution should be added to the latter. This quantity will be larger or smaller according to the superfices of the prints to be toned and the bluer or redder tone desired. A little practice will soon enable one to judge of the quantity required. Should the prints tone too slowly in consequence of too little gold having been added they may be removed and a little more added, though when there are many prints to be toned it is best not to put in more gold than sufficient to tone them in about five minutes. The toning may be checked at any moment as with silver prints, and the print should not be washed, but transferred at once into a fixing bath of one litre of water to fifty grammes of hyposulphite of soda.

INCREASING THE SENSITIVENESS OF COLLODION BY COLOURING.

The following method of measuring the sensitiveness of collodion—apparently the exact reverse of the principle underlying the preparation of isochomatic films—is described in the *Archiv* by Herr G. P. A. Garjeanne, of Amersfoort, who says he has found that the addition of a blue dye to collodion considerably increases its sensitiveness. He had a remainder of of collodion prepared according to the following formula:—

Ether	200 parts,
Alcohol	200 ,,
Cotton	4 ,,
Iodide of ammonium	2 ,,
Iodide of cadmium	2 ,,
Bromide of cadmium	1 part,

and a trace of nitric acid.

The collodion had become golden-yellow and was turning red; it worked slowly and hard. He stained it with Hofman's violet B B (an aniline colour), after which the negatives became much richer and the sensitiveness was greatly increased. He then prepared another collodion—

Ether	200 parts,
Alcohol	200 ,,
Cotton	4 ,,
Iodide of cadmium	3 ,,
Pulverised bromide of potassium dissolved in a few drops of water	2 ,,

and stained it with methal-violet. With a poor single lens and this collodion he took photographs with an exposure of five seconds in the shade, and almost instantaneously in the full sunlight. He, therefore, asks whether greater sensitiveness could not be imparted to collodio-bromide of silver by using a blue stain. If the addition of a yellow colouring matter to the film raises the sensitiveness of the rays of lower refrangibility while it diminishes the action of the more refrangible, the above mode of treatment may be expected to produce an exactly opposite result, and to be only beneficial in a good light and with circular subjects.

A RAPID PROCESS FOR PROOFS ON PLAIN PAPER.

MAJOR HANNOT, of the Belgian Engineers, employs the following process for reproductions on plain paper. He says that for maps it is one of the best, and is not generally known. The paper is first salted in the following bath:—

Chloride of ammonium	2 grammes.
Citrate of soda	2 ,,
Water	100 cubic centimetres.

When the paper is dry it is sensitised upon a five-per-cent. solution of nitrate of silver, to which a few drops of citric acid have been added. The paper is exposed to light under a negative for but a few seconds, for to get good results by development no visible image should be brought out by light. The development is effected by plunging the proofs in the following solution:—

Gallic acid	1 gramme.
Acetate of lead	½ ,,
Rain water, acidulated with three or four drops of glacial acetic acid	4 litres.

When the image is sufficiently developed it is fixed at once in a thirty-per-cent. solution of thiosulphate of soda. The print loses no intensity in fixing. When these operations are properly performed the prints, he says, are of good tone and need no intensification, all the more so because they are required only for the purpose of making tracings.

GALLIC ACID AS A RESTRAINER OF DEVELOPMENT.

MR. H. Y. E. COTESWORTH recounts in THE BRITISH JOURNAL OF PHOTOGRAPHY how, in the course of some attempts to utilise gallic acid as a developing agent, he discovered that it was, on the contrary, a most powerful restrainer, and that it promised to prove a valuable antidote to over-exposure. In the course of his remarks he says:—A plate of known value as to sensitiveness was exposed for the normal time, and a developer of the ordinary character, only substituting gallic for pyrogallic acid, applied. Saturated solution of gallic acid was used instead of pyro., and ammonia and bromide added in usual quantities. The result as regards image was absolutely *nil*, though the ammonia was "piled on" until it would have fogged any decently-ordered plate if pyro. had been used instead of gallic acid. I thought I must have made some simple omission in the process of exposure—probably had not drawn the shutter; so I repeated the experiment, exposing a plate, cutting it in halves and developing one with pyro., and *failing* to develope the other with gallic acid. The latter half of the plate was washed and treated with the ordinary pyro. developer, when a clean, under-exposed negative resulted, though the other portion of the plate had been fully if not overdone. This result set me thinking as to the possibility of gallic acid proving a practical restrainer for over-exposed plates; and in the end, to cut a rather long description short, I found it to be not only that but more. It is a restrainer of a very powerful character, and it may be used *in conjunction with pyro.* to give vigour and density with a very small proportion of pyro., if time be no object. Thus, half-a-grain to the ounce of pyro., supplemented by gallic acid, will give a negative of far greater vigour than a three-grain pyro. solution if a little time be allowed for its action. This, however, is not an important application.

In cases of known over-exposure the addition of a certain quantity of gallic acid to the ordinary developer will prove as effectual as citric acid; or the plate may be soaked first in gallic acid and then developed in the ordinary manner. As an instance: I today exposed a plate very fully, cut it into three portions, developing one in the ordinary manner, treating it as a case of *known* over-exposure; the second with half the quantity of pyro. with the addition of gallic acid; the third was soaked in gallic acid first, washed, and developed in the ordinary manner. The first is thin and feeble from over-exposure; the second and third, though five or six times the quantity of ammonia had to be used, are strong, vigorous negatives, without a trace or symptom of over-exposure.

THE CARE OF THE NEGATIVE FIXING BATH,

THE following hints contained in an editorial article in THE BRITISH JOURNAL OF PHOTOGRAPHY would, if more generally followed, cause a great diminution in the complaints of stained and dirty films:—With regard to the fixing bath itself: the exhibition of care should commence at at the very earliest stage. Many of the samples of hypo. met with in commerce are very impure, containing most of them free acid, some few having an alkaline reaction, while all are mixed with mechanical impurities in the form of dirt. Let us commence, then, by making a saturated solution. In our own practice we place (say) seven pounds of hypo. in a large basin, pour on to it boiling water, and allow it to stand for a few hours with occasional stirring, and, if necessary, more water is added, until a saturated solution is formed and only a few crystals remain undissolved. It is now tested with litmus paper, which is nearly certain to be reddened; a solution of washing soda is made, and this is added—a few drops at a time and well mixed before each fresh addition—until the blue colour of the litmus is restored. If the sample be decidedly alkaline it should be *nearly* neutrallised with dilute hydrochloric acid. On no account must the solution be employed while in an acid condition. This matter having been attended to, the dirty-looking solution is filtered into a large, brown stoneware jug, from which the necessary quantities either for prints or negatives are poured off as required. For prints one part of the saturated solution is mixed with three, four, or even five parts of water, and when this dilute solution has served its purpose once for prints it is set aside for negative purposes. In using the bath much must, of course, depend upon individual circumstances. In large establishments, where a great amount of work—both in negatives and prints—is done, it will be convenient to employ a fresh bath daily, consigning the old one to the waste tub. But this method will not answer for an amateur, to whom we recommend the plan of using two baths—that is to say, of using one bath until it is saturated, when it is set aside for "renovation," if that system be preferred, and replaced by another. If a considerable amount of printing be done it is probable, in the case of an amateur, that very little of the real use of the fixing bath will have gone out of it when it has served its purpose on the few prints required to be fixed at any one time, though it cannot be employed again for the same purpose. In such cases the bath may be placed aside in a special receptacle to form a stock solution for fixing negatives. Each bath should consist of a quantity of solution considerably larger than is actually required to fill the dish or dipping bath when in use. After each day's work is finished the solution which has been in use should be returned to its receptacle and the fixing dish carefully washed. During the night any sediment will subside, and the clear solution is poured off for next day's use. In this manner and with proper care in washing the negatives it will be impossible for the hypo. solution to go very far wrong, and it will only be when it approaches saturation or its action becomes too slow that it need be discarded. Many people, instead of discarding altogether a spent bath, prefer to "doctor" it into working order again. Others, again, imagine that a mixture of alum and hypo. possesses the power of recuperation within itself. As we have long since pointed out, alum and hypo. mutually decompose one another, and the only result of such a mixture is to set up a state of doubt as to what is really being used. That alum brings about the precipitation of the dissolved silver is beyond doubt; but if its aid be invoked it is better to apply it by dropping a crystal into the warmed and filtered bath, when a lively disengagement of gas will take place, and the greater portion of the silver will be precipitated and may be removed by filtration. After strengthening from the stock jug the bath is ready for use again. On the whole, we are inclined to doubt the wisdom or economy of the recuperative system.

THE PROPORTIONS OF THE INGREDIENTS TO DIFFERENT DEVELOPERS.

THE following table, compiled by Mr. W. F. Mayes, C.E., gives approximately the quantities of pyro., ammonia, bromide, and other materials in each ounce of the developers of the principal commercial makers of plates:—

Name of Maker.	Ammonia	Pyro.	Bromide.		Glycerine, Sugar, &c.	Sulph. of Soda	Remarks.
			Amm.	Pot.			
	Minims.	Grains.	Grains.	Grains.	Minims.	Grains.	
Wratten's—							
"Drop Shutter"..	3·00	3·00	·75	..	..	..	
"Ins'taneous"..	1·66 to 2·50	3·00	..	·21 to ·31	..	..	
Ordinary	1·66 to 2·50	1·50	..	·21 to ·31	..	..	
Swan's	2·96	1·00	2·22	..	..	..	
Edwards's	1·87	2·10	·23	..	4·20 gly.	..	
Nelson's	12·00 to 12·30	1·00 to 1·84	3·00	..	3·40 grs. sugar.	..	
Thomas's	6·00	1·00	2·50	..	..	..	
Rouch's	3·00	1·26	1·26	..	..	5·04	
Mawdsley's	2·96	1·50	..	1·00	..	..	
Autotype	0·86	2·30	0·30	..	..	..	
Bennett's	5·00	1·50	..	0·60	..	..	
York's	3·00	2·00	..	0·25	¼-gr. citric acid.	..	
Pumphrey's Films	1·88	3·75	..	1·00	1·00 gr. ditto.	15·00	
Captain Abney	2·66	0·90	..	1·35	..	..	*Photography with Emulsions*, page 192.
,, Coll. Emul.	3·00	2·40	..	8·00	..	..	Ditto, page 91.
Canon Beechey's Coll. Emul.	21·82	8·73	..	2·18	..	..	Carbonate of ammonia.

MOUNTING PRINTS ON MUSLIN.

AT a recent meeting of the Rochester (New York) Photographic Society, Mr. J. M. Fox gave the following account of his method of mounting prints on cloth. He said:—After trying many experiments in double mounting on muslin I have adopted the following method. I prepare several yards of cloth at a time by sizing with starch, and always keep a roll of it on hand ready for use. While damp the cloth is stretched not too tightly on a frame and sized plentifully with warm starch paste made rather thin, and spread on evenly. Where large quantities of muslin are used perhaps tenter bars might be employed to advantage for stretching.

When dry cloth is cut to the size required before mounting, allowance being made for the expansion of the prints, if the starch for mounting be used while warm (which I think is preferable), it should be as stiff as can be conveniently spread on the print, for the reason that it will expand the cloth less and dry quicker. From the moment the first print touches the cloth despatch is important; therefore both prints are first pasted, one being laid aside ready to be picked up quickly. The first print is rubbed down with a hand-roller, which can be done more expeditiously than with the hands. When the second print is properly laid on the side there is less occasion for haste, and rubbing down by hand is preferable; because, although the roller does the work perfectly on the first print mounted, it is liable to leave air-bubbles in rolling down the second one. To avoid bubbles in the hand-rubbing the strokes should be towards the middle of the print, and not in every direction from the centre. When the mounting is completed the prints are placed between papers and covered immediately with several folds of cloth of sufficient weight to keep them in place. To facilitate drying they may be aired after an hour or two and placed between dry papers and again covered with the cloth.

CITRO-CHLORIDE EMULSION FOR OPALS.

Appended is given Mr. W. M. Ashman's most recently-published formula for a citro-chloride emulsion for opal work:—

	A.	
Nelson's No. 1 gelatine	60	grains.
Water	1½	ounce.
	B.	
Chloride of sodium	40	grains.
Citrate of potash	40	,,
Water	1	ounce.
	C.	
Nitrate of silver	150	grains.
Water	1	ounce.

B is added to A, and the temperatures raised to 150° Fahr. C, also at a heat of 150°, is then slowly added. Boil for ten minutes, allow to cool down to 150°, then add 100 grains of Heinrich's gelatine previously soaked in two ounces of water, and stir till dissolved. After setting and washing add one ounce of alcohol in which one grain of salicylic acid has been dissolved.

THE PROPERTIES F DIFFERENT RESINS.

Calcutta copal, and others of its class, as well as amber, which forms the basis of varnishes, are not in their crude state soluble in either oil of turpentine, benzine, petroleum, or other hydrocarbons, nor in vegetable oils. They become soluble when, by a preliminary distilation or incineration, they are deprived of twenty-five per cent. of their weight. This result was announced some time ago to the Academy of Sciences of France by M. Violette. The following results are from recent experiments:—1. The above resins, when heated to a temperature of 350° or 400° Cent. (about 600° to 750° Fahr.) in a closed vessel, acquire after cooling the property of dissolving in the above liquids, and constitute excellent varnishes without any loss of material.—2. When heated as above mentioned *alone*, or mixed with one or more of the liquids named, these resins dissolve perfectly in them and constitute very fine varnishes.—3. Calcutta copal, heated in this manner with one-third of its own weight of boiled linseed oil, and three-quarters of its weight of oil of turpentine, gives at once, without loss, a thick varnish, clear, limpid, of a fine colour, slightly yellow, and quite fit for carriage varnish.

THE MANAGEMENT OF FERRO-PRUSSIATE PAPER.

THE *Archiv* repeats the following hints for the treatment of lichtpaus pictures upon cyanotype paper (dark lines on a white ground) during warm weather:—Keep the prussiate of potassium bath very weak, and keep adding water very frequently to make up for the loss by evaporation. The acid bath should not be too strong, otherwise it dissolves the size in the paper, and it must also be dilluted with water from time to time. By exposing the paper much longer the development may be undertaken with a solution of two grammes of gallic acid in one litre of water, instead of with prussiate of potash, but the salt must be completely reduced by the exposure.

A VEHICLE TO CARRY THE COLOUR FOR DARK-ROOM WINDOWS.

THE ammoniacal solution of shellac is said to be useful for the formation of dyes, and on the description given for making them a capital mode of colouring fabrics for dark-room windows might be founded. It is stated that a solution of aniline yellow in water, for instance, added to the ammoniacal solution—a description of a mode of making which has often appeared in our columns—gives a dye which is waterpoof, and applicable to wood or paper. It is obvious to those who have any acquaintance with aniline dyes that the presence of ammonia will be utterly inimical to the integrity of some of the colours. Magenta red, for example, when boiled for some time in the lac solution, is first converted into red and then into violet. Still, there are colours that could be usefully employed, and the presence of the lac would so protect the surface of the fabric as to enable it to be sponged in order to remove the almost inevitable splashes from the dark-room manipulations.

ALBUMENATE OF SILVER.

HERR O. Löw has, says the *Archiv*, thoroughly investigated albumenate of silver. In the dark an ammoniacal solution of nitrate of silver does not change, and it is not until heat is applied that a reddish-brown albumenate of silver substance is precipitated, which redissolves in ammonia, and from which it may be reprecipitated by dilute sulphuric acid. It is also soluble in excess of the acid as well as in all dilute alkalies, but it is insoluble in alcohol and in water. If the reddish-brown substance be digested in baryta water or in muriatic acid the greater part of the silver will be thrown down in the metallic state. The nitrogenous substance remaining in the solution possesses the reactions of peptone. Quantitative analyses of albumenate of silver showed a variable quantity of silver, depending upon the duration of the digestion and on the amount of nitrate of silver present; usually, however, it was about thirty-two per cent.

THE DETECTION OF TARTARIC IN CITRIC ACID.

ACCORDING to Herr H. Akenstadt, tartaric acid may be detected by adding five drops of a five-per-cent. solution of the suspected sample to about half-an-ounce of lime water, which must be strong or the reaction will not be discerned. If tartaric acid be present a milkiness wlll ensue, and become more marked as the solutions gradually mix, shaking the mixture being carefully avoided. Herr Push mixes a small quantity of the citric acid in a dry test tube with ten times its weight of sulphuric acid, and allows the substances to react for an hour. He then places the tube in a water bath heated almost to boiling, when the materials will melt to a lemon-yellow coloured liquid, which will remain unchanged for an hour if the sample be pure, but will become brownish coloured in half-an-hour, and reddish brown in an hour, if tartaric acid, even in so small a proportion as one-half per cent., be present.

THE PURIFICATION OF ALBUMEN.

THE purification of egg albumen often assumes considerable technical importance, and various intricate methods for performing it have from time to time been proposed by chemists; but in a late number of the *Medical News* a method of a much simpler character, devised by Dr. Reichart, is described. He simply treats the solution of albumen free from membrane with carbonic acid gas, or even with the contents of a bottle of seltzer water. A precipitate of globuline, &c., is produced, and, when filtered off, leaves a solution of pure albumen.

M. PHILIPPE'S ANILINE PRINTING PROCESS.

M. PHILIPPE'S aniline printing process consists of floating albumenised or gelatinised paper upon a bath of bichromate of copper and ammonia (ten to fifteen per cent.), drying it, and exposing it under a negative. When a powerful picture has been produced it is laid in a one-per-cent. solution of cyanide of potassium until the whites are quite clear. It is then allowed to drip, after which it is placed in a very acid aniline bath, consisting of—

Water	100 parts.
Oxalic acid	10 ,,
Aniline	1 part.

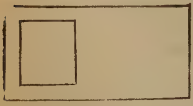
In a very short time the dye becomes fixed upon the parts which the light had reached, and the picture becomes powerful and assumes a tone very similar to that of silver prints.

THE MECHANICAL CONTRIVANCES OF THE YEAR.

ADAPTING THE CAMERA FOR DIFFERENT-SIZED PICTURES.

IN a leading article in the Journal a method is described by which a camera of large size can be used for the purpose of takin gtwo or more smaller pictures upon the same plate, without in any way interfering with its efficiency for its proper size. The principle is also adopted by at least one professional camera maker. The following description refers to a 7½ × 5 camera.

The first necessity is to cut, in the inner framework of the camera to which the bellows are attached and immediately in front of the focussing glass, a sunk rebate of the same size as, and corresponding with, the position of the plate when in the dark slide. The depth of the rebate need not be greater than one-sixteenth of an inch, or just sufficient to take a sheet of zinc or stout cardboard. The latter forms a mask by which one-half of the plate is covered during the exposure of the other half, and two pictures can be produced on the one plate. This purpose is effected by cutting an aperture of the desired size and shape in the centre of one-half of the zinc-plate, thus:—



This plan is better than employing the central partition usually supplied with cameras of the sizes we have named, since it takes less time to place the mask in position or remove it. It allows lenses of any focus up to the full length of the camera to be used, whereas the central division being intended for stereo. purposes is rarely longer than 6 inches; and last, but not least, if the aperture be of the dimensions of 3 × 3, the operator sees at the time of focussing exactly the amount of subject he will have on his slide, and runs no risk of spoiling the composition by crowding in too much.

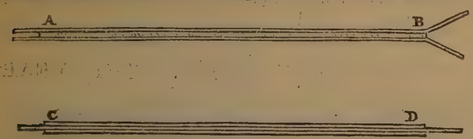
Except with a lens of very short focus there is no absolute necessity to shift it from the centre of the camera front. If it be capable of covering the whole of the plate when in that position it will, of course, cover the half; but where it is possible, by lengthening the slot in the horizontal sliding front, to bring the lens opposite the centre of the half-plate, or nearly so, it is obvious the best portion of the lens will be utilised.

After taking one picture the mask is merely reversed, the front, if movable, pushed to the opposite end of the slot, and the next picture taken. Or if a whole plate be required the mask is removed altogether.

PACKING DRY PLATES WHEN TRAVELLING.

Of the numerous methods practised of packing plates by the insertion of paper, cardboard, or other material between their surfaces to prevent damage, it is generally conceded that the best consists in employing a mask or narrow "washer" of thin cardboard as the separating medium. This, being in its external dimensions the same size as the plate, cannot possibly move, and so produce markings on the sensitive film. The only drawback to the general adoption of the plan is the trouble involved in making the masks. Mr. C. Beckett Lloyd, however, describes the following method which greatly simplifies the work. He says:—

Take any good smooth and tolerably-stout paper, and cut it into pieces of any convenient length and of the following widths—the length is immaterial, the width important:—Two strips a-quarter of an inch *wider* than one dimension of the plate, and one strip an eighth of an inch narrower than the same dimension; then two strips an eighth of an inch *narrower* than the other dimension, and one a-quarter of an inch wider. The two sets of three are then pasted together sandwich fashion, and the two longer (or shorter) strips outside and the odd one in the centre, as shown in the diagram, which represents an end section of the compound sheets. An examination of the figure will show that A and C form what the joiner calls a "tongue and groove." When quite dry, the two surfaces of the projecting portions at C and D and, if necessary, the inner surfaces at A and B are well gummed (the latter being opened, as at B, for the purpose), and again allowed to dry.

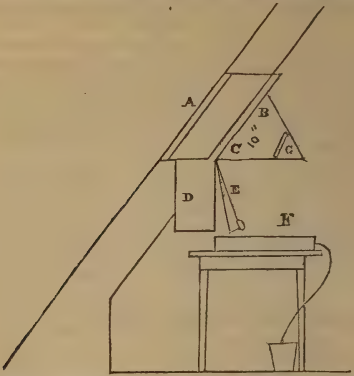


We have now a three-sheet cardboard with its edges tongued and grooved. By means of a sharp penknife and straight edge the sheets are cut into strips, three-sixteenths of an inch wide, in the direction of A B, C D. Three strips, which present the same Section. as in the diagram, are fitted together after the manner of a school slate-frame, the gummed extremities being moistened with the tongue, placed together, and pressed into contact with the thumb and forefinger—four such operations, which occupy less than a minute, completing the frame.

As an example, suppose the masks are required for a half-plate (6½ × 4¾): we cut two strips of paper 6¾ inches wide and one 6⅛ inches for one dimension, and one strip 5 inches and two 4⅜ inches wide for the other dimension. If the composite sheets are cut into strips three-sixteenths of an inch wide they will form, when fitted together, masks one-eighth of an inch smaller each way than the plate, the corners crossing like an Oxford frame. When dry the corners are trimmed square with the scissors. The masks made in this manner will bear any degree of rough usage within reason without breakage, and they form the best means of packing either plates or negatives that I have ever tried. In the course of a single evening a sufficient number may be made to pack a gross of plates. I have timed myself and find that, having the composite sheets ready to cut up, I can easily cut the strips and put together six dozen masks (sufficient for a gross of plates) within an hour and a-half; so that, however complicated the description may look on paper, there is but little trouble in practice.

A DEVELOPING-ROOM WINDOW.

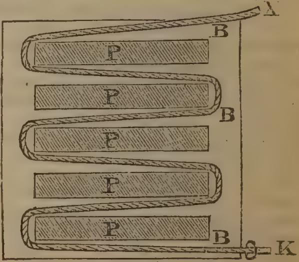
Mr. T. H. Knolles describes the arrangement he employs for the illumination of his developing room, in which the special feature is that the direct light is shaded from the eyes and thrown downwards upon the plate. There is also an opaque shutter which permits the quantity of light admitted to be varied at will. The accompanying diagram will sufficiently describe the arrangement.



A Window, two feet by one foot six inches. B Screen, canary medium. C Brown-paper shutter, movable at will. D Box to throw down light in front of developing tray. E Brown paper, movable at will. F Washing trough. G Printing-frame exposed.

A SIMPLE MODE OF PACKING PLATES.

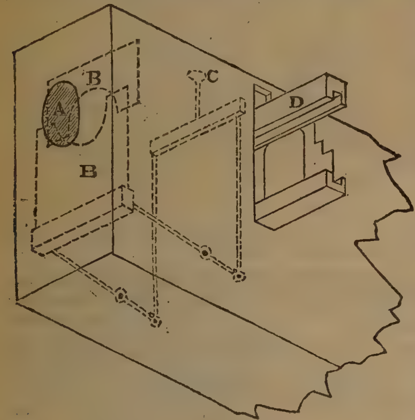
A method, at once ingenious and simple, of packing dry plates in boxes was communicated to the Berlin Association for the Cultivation of Photography by Mr. Kilburn, of Littleton, New Hampshire. An ordinary box about the length and width of the plates to be packed is taken, and two long, soft, white cords laid parallel to each other across the bottom of the box, one end of each being made fast as shown by K, while the longest part of the cord hangs outside the box. The two cords are laid smooth and parallel along the bottom of the box; the first plate is then laid down upon them, and the cords are turned across over the plate, so that they hang out at the opposite side to that from which they did before. The second plate is then laid on the first one, and the cords doubled back again; another plate is put in, and soon until the box is full. To take out a plate: pull the strings, which will at once raise the uppermost plate. Mr. Kilburn says there is no fear of the string marking the plates. He has transported thousands of plates in this way, has already used about 1,800 of them in Europe, and has as yet only had one broken plate. In order to keep out light perfectly the box is placed in a second somewhat larger box, and that again in a third.



DISSOLVING VIEWS ON A SINGLE LANTERN.

Amongst other novelties of the past year the patent records contain at least one method of dissolving pictures in a single lantern. The one referred to—Mr. B. J. Edwards's—has been fully described in The British Journal of Photography; but being the subject of a patent would be out of place here. Mr. J. W. Wade thus describes a contrivance of his own for a similar purpose, which by the aid of the diagram will be rendered intelligible. Mr. Wade says:—

The body of the lantern is made so that it forms a square box between the condensers and the objective. In this, close to the lens and sliding in grooves, are pieces of cardboard cut as at B B, and connected by a cord passing over a roller at the top. By pressing the button C the light is cut off, and at that instant the double carrier D is pushed until the end is flush with the side of the lantern. Pressure is then taken off the button and the shutter opened, the lower portion being weighted.

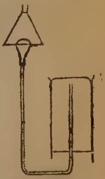


By a little practice I was enabled by the apparatus to show a series of slides with one lantern without the audience seeing any change of picture or any darkness between the different views. The apparatus is quite out of sight, with the exception of the projecting end of the carrier and the small button C. By a slight modification I can use it a dissolver for two lanterns.

AN AUTOMATIC FILTER.

The following diagram and description are taken from the *Chemical News*:—

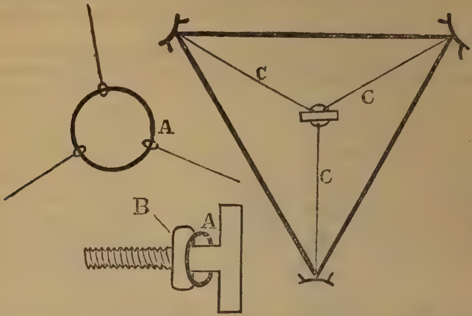
When large quantities of liquids, such as reagents, have to be filtered in the laboratory, it is often convenient to have some means by which the filter is kept filled. The usual "bird-fountain" method, which is applicable in some cases, has the disadvantage of requiring the inverting of large bottles or flasks filled with liquid, and besides this it does not maintain the liquid at a constant level in the filter. The following apparatus has been found more convenient. To the longer limb of a syphon is attached a short piece of india-rubber tube projecting a little beyond the tube; the india-rubber is closed by the narrow conical stem of a small glass globe which floats on the surface of the liquid in the funnel. When the liquid rises to a certain height the float is lifted and stops the flow of the liquid, the narrow stem on the float which passes some distance into the syphon acting as a guide. The apparatus keeps the liquid in the funnel at a constant level, and may be left without attention until the filtration is complete.



A SAFETY CAMERA SCREW.

Mr. A. Corbet writes to the Journal as follows:—

Several of your correspondents seem to find a good deal of difficulty in rapidly placing the screw which attaches the camera to the stand, and some have to carry it loose at the risk of losing it or forgetting it.



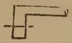
B, Collar on screw. The split ring, A, must just pass over this; when the three small rings are put on, it cannot come off again. C, String.

I have fastened mine to the triangle, as shown in the diagram, and never find any difficulty or delay in setting up for a "shot." It is always in its place.

A TRAVELLING LANTERN.

The annexed illustrations represent the different parts of a developing lantern which, if not particularly new, has at least the merit of being easily made. It is thus described by a correspondent signing himself "Lux":—

FIG. 1.



Movable chimney to place over hole.

FIG. 2.

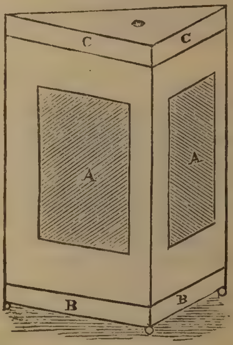
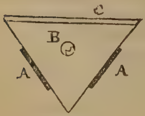


FIG. 3



Section.

Fig. 2. A, Thomas's ruby fabric. B, Bottom of box. C, Lid of box.
Fig. 3. A, Ruby light. B, Candle. C, Solid pasteboard backs.

I had a tin (triangular) box made just the size to cover my tripod-head when shut up inside it. This, when separated (lid from bottom), forms the bottom and top of my lantern, and in it I set up the folding, strong pasteboard sides of the lantern. Provision is made for ingress and egress of air for combustion of a piece of sperm candle.

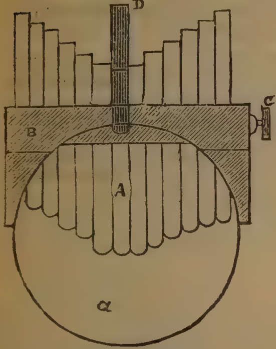
The joints are made of cloth glued on and covered with a strip of the ruby fabric to make it safe, and when set up for use I close the joints at top and bottom by a broad piece of elastic braid sprung on, which tightens up the lantern and holds all well together.

The advantages are:—When unpacked the lantern occupies very little space, as it folds up quite flat, in the same size as the folded camera body and slides; the top and bottom take little more space than is necessary for the carriage of the tripod-head.

A SKY SHADE.

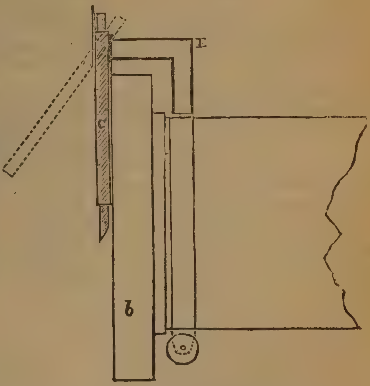
The device illustrated below is a very old friend resuscitated, but the idea may be new to some. In its most recent form it is due to Mr. A. Henderson, of Montreal. *Fig.* 1 is a front view of the lens, with the shade arranged for a picture with distant mountain at the head of valley and trees at sides. A, narrow strips of brass, grooved and tongued like ordinary flooring. B, the brass frame, in which they slide easily, the necessary friction being got by turning the milled head C. D, the rod by which the shade is attached to the support E (*fig.* 2), to which it is hinged just firmly enough to remain at any desired angle and to move easily when required. *Fig.* 2 is a side view of the lens, showing the method by which the shade is attached, the dotted lines indicating it partly raised.

FIG. 1.



a, Front of lens.

FIG. 2.



b, Front of lens tube.

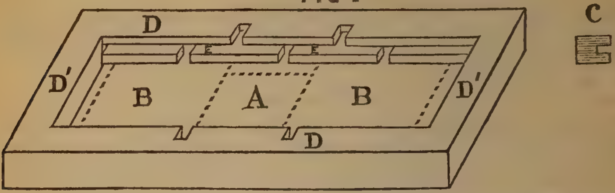
A STEREOSCOPIC TRANSPARENCY PRINTING-FRAME.

As there are hopes and signs in various quarters of a revival of the taste for stereoscopic photographs, the accompanying sketch of a stereoscopic transparency printing frame is reprinted from the Journal.

In its simplest form—that is to say, when required for use only with negatives of the old stereoscopic size, 6¾ × 3¼—it consists merely of a negative frame (*fig.* 1) and a sensitive plate-carrier (*fig.* 2). The former consists of a tray, about three-quarters of an inch deep, with an aperture A, in the centre of B B, of the exact size the pictures are required to be—two and three-quarter to three inches square according to taste; or a shallow rebate may be sunk to receive masks of stout zinc or cardboard, so that the shape and size of the pictures may be varied to suit the subject and circumstances.

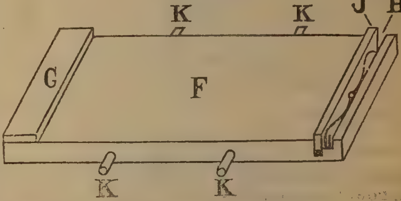
The longer sides of the frame consist of mouldings having the section shown at C (*fig.* 1), the ends being solid. On the upper surface of each of the sides D D two slots are cut as shown, so that when the plate-carrier is placed in the centre of the frame its projecting runners will drop into the longitudinal grooves E E, only one of which is visible in the diagram, a space of (say) one-eighth of an inch remaining between the lower surface of the plate carrier and the bottom of the tray. In the lower floor of the groove E at each side are cut three similar slots—one in the centre, the others equidistant therefrom and corresponding with the width apart of the projecting runners of the carrier.

Fig 1



The carrier, which is shown in *fig.* 2, with its under side uppermost, consists of a block of perfectly-flat wood half-an-inch thick, three and a-quarter inches wide, and eight and a-quarter inches long. Across one end is glued a strip of very hard wood or of brass, G, three-quarters of an inch broad and one-sixteenth thick, with a perfectly square edge. At the opposite end a groove H is cut, three-eighths broad, three-eighths deep, and the same distance from the extremity of the carrier. A strip of very hard wood or brass, J, an eighth of an inch thick and of such length and width that it reaches from side to side of the carrier and projects one-sixteenth of an inch beyond the surface F, is kept in position by a good, strong spring or springs, as shown. The projecting runners K K K K may conveniently be made by driving into the sides of the carrier short lengths of brass rod an eighth of an inch or three-sixteenths thick, allowing a-quarter of an inch in length to project. The reverse side of the carrier has a knob by which to hold it.

FIG. 2



Now, it will be seen that if a plate measuring 6¾ by 3¼ (the size of a stereo. slide) be pressed down upon the centre of the block it will be gripped between G and J by the spring, and so securely held. Further: if the carrier with the plate downwards be placed in the centre of the frame D D D D the runners will drop into the longitudinal groove, in which position the carrier may be freely moved to either end of the frame without the surface of the plate coming in contact with anything. But as soon as the carrier reaches the extreme end of the frame its runners on either side coincide with two of the lower slots, and the plate and carrier drop into contact with the bottom of the tray, in which position—if the respective dimensions of the runners and the slots be properly arranged—there is no chance of abrasion of the contact surfaces by lateral motion.

To use the frame the negative is laid face upwards at one end of the tray, its position being fixed by a strip of thin brass shown by the dotted lines at either end, so that the proper portion comes opposite the aperture A; the carrier, with its sensitive plate, is placed in position and run to *the opposite* end of the frame, when the plate falls into contact with the negative, the left-hand half of the former being superposed upon the right-hand half of the latter, or *vice versâ*, and while thus held in contact the first exposure is made. Now, by means of the knob, lift the carrier into the central groove, and while sliding it to the opposite end of the frame incline the latter in the contrary direction, when the relative positions of negative and plate are reversed, and the second exposure is made.

This form is only suited for negatives of the old standard size, but the same principle can easily be adapted for use with double negatives of any size, though it then necessarily becomes a more complicated arrangement. *Fig.* 3 will, however, sufficiently explain the more complete frame. Here D D D D is again a frame identical in size and construction with *fig.* 1, but *minus* the bottom, which converts it into a tray. F again represents the carrier, which is in every respect similar to *fig.* 2. The tray in this case is separate, and the frame attached to it by hinges; its size will depend upon the dimensions of the negatives to be used. In order to permit a three-inch square to be printed from any portion of either half of (say) an 8 × 5 negative it is necessary to provide movable guides regulated by screws, two of which are shown in L and L′, the third corresponding with L′, being hidden by the hinged frame D D D D. The position of the negative shown by the dotted lines may be varied, by altering the positions of the guides or stops, so that the top right-hand corner of the bottom left-hand or the centre of either half of the negative may be selected.

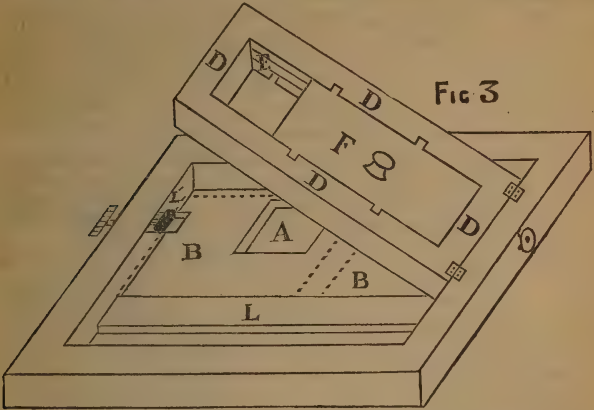


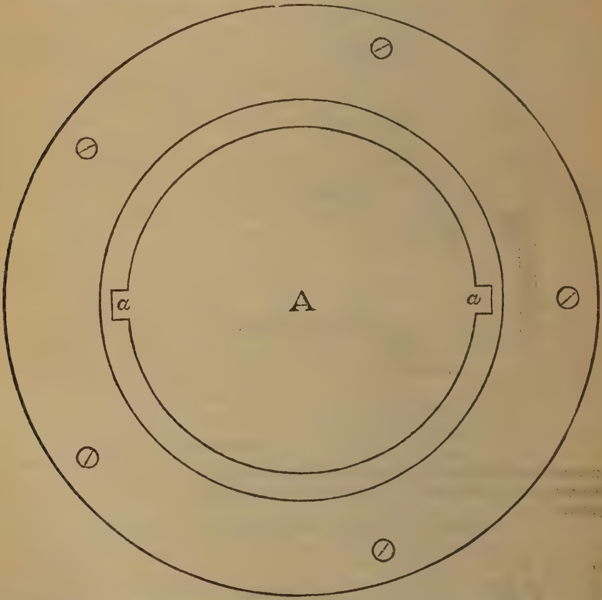
FIG 3

It would be quite useless to attempt to give working dimensions without knowing the size or sizes of negatives to be employed, the distance apart of the lenses, the distance apart the images are required, and the size of the half pictures—all elements of importance. A frame for 7½ × 5 negatives only may be made whose extreme dimensions will be 12½ × 10, and allow every latitude. If, however, it be required for use with 6¾ × 3¼ negatives as well, more elaborate adjustments would have to be made in order to accommodate the greater range required in the sliding parts. The frame for 6¾ × 3¼ negatives measure about 12 × 4¾, and can be constructed for a few shillings.

Sixteen or seventeen years ago, when stereoscopic work was more in vogue, we had several of these frames made of various sizes for ourselves and friends, and found them a very great convenience, more especially when duplicates were required from the same negative. The adjustment once made, the trouble is no greater and the time occupied longer only by a few seconds than in making a single transparency by superposition.

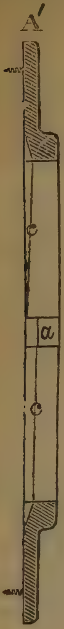
A SUBSTITUTE FOR THE SCREW ON LENS FLANGES.

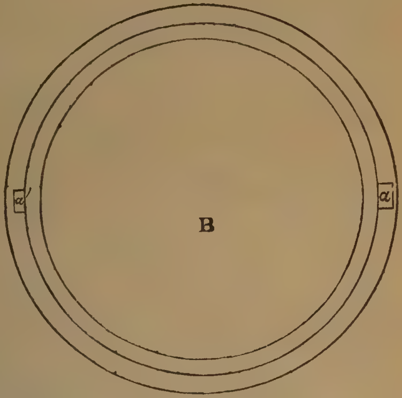
In the course of an article in the Journal Mr. Andrew Pringle describes a useful modification of the lens mount by which the nuisance and waste of time of screwing in the lens is avoided. It is thus described:—

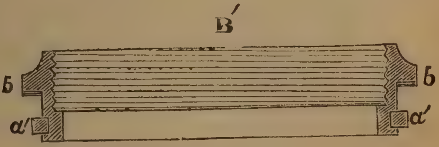


A, is the flange screwed to the camera. B, the adapter into which the lens goes. A, section of A.

"The flange A has two sharp cut holes, *a a*, behind which are two inclined planes, *c c*, as seen in the section A′. A ring, B, fits the lens, and has two studs, *a′ a′*, hard-soldered on, which slip into *a a*, the lens gets a short turn when the studs move along *c c*, an inclined plane, and clamps itself. On the section B′, *b* is a leather washer, which not only helps to keep out light, but makes the clamping more secure. Nothing can be simpler or more efficient; in a moment the lens is in its place and tight, and all my lenses, with their adapters, fit B, so that it is all the same what lens I use—it is in in an instant."

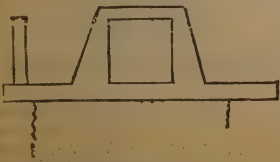






B′ section of B.

MR. A. COWAN'S LANTERN-CARRIER.



THE annexed cut represents a simple and ingenious device of Mr. Cowan's for rapidly changing the slides in a single lantern. The movement of the slides is backwards and forwards alternately, the motion being imparted by means of the strings shown. When a slide has been shown a pull at one string causes the next one to displace it, and that in turn is exchanged for a third by pulling the other cord.

FORMULÆ.

FORMULÆ FOR THE "DUSTING-ON" PROCESS OF PHOTO-ENAMELLING, PRINTING OPALOTYPES, REPRODUCING NEGATIVES, PRODUCING PICTORIAL EFFECTS IN NEGATIVES, &c., &c.

No. 1.

Saturated solution of bichromate of ammonia	5 drachms.
Honey	3 ,,
Albumen	3 ,,
Distilled water	20 to 30 ,,

No. 2.

Dextrine	½ ounce.
Grape sugar	½ ,,
Bichromate	½ ,,
Water	½ pint.

No. 3.

Gum arabic	6 parts.
Bichromate of potash	2·5 ,,
Grape sugar	4
Water	72 ,,

No. 4.

Honey	4 drachms.
Glucose	8 ,,
Albumen	6 ,,
Dextrine	3 ,,
Bichromate of potash	8 ,,
Water	20 ounces.

COLLODION.—ORDINARY BROMO-IODISED.

A.—	Sulphuric ether	20 ounces.
	Alcohol	10 ,,
	Pyroxyline	2½ drachms.
B.—	Iodide of cadmium	90 grains.
	Iodide of ammonium	90 ,,
	Bromide of ammonium	40 ,,
	Alcohol	10 ounces.

One part of B (the iodising solution) must be added to three parts of A, which ought to be labelled "plain collodion."

DEVELOPERS.

FOR COLLODION POSITIVES OR FERROTYPES.

Protosulphate of iron	1½ ounce.
Nitrate of baryta	1 ,,
Water	1 pint.
Alcohol	1 ounce.
Nitric acid	40 drops.

FOR NEGATIVES.

No. 1.

Protosulphate of iron	¼ ounce.
Glacial acetic acid	¼ ,,
Alcohol	½ ,,
Water	8 ounces.

No. 2.

Protosulphate of iron	15 grains.
Acetate of soda	15 ,,
Glacial acetic acid	30 minims.
Alcohol	30 ,,
Water	1 ounce.

No. 3.

Protosulphate of iron	1 ounce.
Glacial acetic acid	1 ,,
Citric acid	½ drachm.
Water	1 pint.

No. 4.

Ammonio-sulphate of iron	75 grains.
Glacial acetic acid	75 ,,
Sulphate of copper	7 ,,
Water	3 ounces.

No. 5.

Protosulphate of iron	7 drachms.
Water	20 ounces.
Collocine	2 small drops.
Alcohol	*quant. suff.*

This developer can also be used for glass positives and ferrotypes.

No. 6.

Protosulphate of iron	1 ounce.
Water	20 ounces.
Liquor ammonia	10 minims.

Then add—

Glacial acetic acid	1 ounce.
Alcohol	*quant suff.*

This solution when newly made has all the advantages of one that has been kept to age.

NOTE.—One or the other of these negative developers is in daily use by the most eminent members of the profession.

FOR COLLODION TRANSFERS.

Pyrogallic acid	5 grains.
Citric acid	3 ,,
Acetic acid	45 minims.
Water	1 ounce.
Alcohol	*quant suff.*

INTENSIFYING SOLUTION.

A.—Pyrogallic acid	3 grains.
Water	1 ounce.
B.—Nitrate of silver	10 grains.
Citric acid	20 ,,
Acetic acid	1 drachm
Water	1 ounce.

For use mix a few drops of B with enough of A to cover the surface of the plate.

FORMULÆ FOR NEGATIVE VARNISH.

Sandarac	4 ounces.
Alcohol	28 ,,
Oil of lavender	3 ,,
Chloroform	5 drachms.

ANOTHER.

White hard varnish	15 ounces.
Methylated alcohol	25 ,,

This will be found a good and cheap varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off. Very suitable for enlarged negatives that are not to be retained.

ANOTHER.

Tough, hard, and durable:—

Shellac	1¼ ounce.
Mastic	¼ ,,
Oil of turpentine	¼ ,,
Sandarac	1¼ ,,
Venice turpentine	¼ ,,
Camphor	10 grains.
Alcohol	20 fluid ounces.

ANOTHER.

Sandarac	90 ounces.
Turpentine	36 ,,
Oil of lavender	10 ,,
Alcohol	500 ,,

ANOTHER.

This one may be rubbed down with powdered resin, and gives a splendid surface for retouching:—

Sandarac	2 ounces.
Seed lac	1 to 1½ ounce.
Castor oil	3 drachms.
Oil of lavender	1½ drachm.
Alcohol	18 fluid ounces.

NEGATIVE RETOUCHING VARNISH.

Sandarac	1 ounce.
Castor oil	80 grains.
Alcohol	6 ounces.

First dissolve the sandarac in the alcohol, and then add the oil.

GROUND GLASS VARNISH.

Sandarac	90 grains.
Mastic	20 ,,
Ether	2 ounces.
Benzole	½ to 1½ ounce.

The proportion of the benzole added determines the nature of the matt obtained.

SELECTED TONING FORMULÆ.

No. 1.

Chloride of gold	1 grain.
Acetate of soda	30 grains.
Water	8 ounces.

This must not be used till one day after preparation. It keeps well, and gives warm, rich tones.

No. 2.

Chloride of gold	1 grain.
Bicarbonate of soda	4 grains.
Water	8 ounces.

This is ready for immediate use after preparation, but it will not keep.

No. 3.

Chloride of gold	1 grain.
Phosphate of soda	20 grains.
Water	8 ounces.

This gives rich tones of a deep purple nature, but must be used soon after preparation.

No. 4.

Gold solution	10 drachms.
Acetate of lime	20 grains.
Chloride of lime	1 grain.
Tepid water	20 ounces.

The "gold solution" before mentioned is prepared by neutralising as much as is required of a one-grain solution of chloride of gold by shaking it up with a little prepared chalk, then allowing it to settle, and filtering off the clear liquid. This toning bath improves by keeping. To use, add two ounces of it to eight ounces of tepid water, which will prove sufficient to tone a full-sized sheet of paper.

No. 5.

Chloride of gold	15 grains.
Water	5 ounces.

Neutralise with lime water, make up to fifteen ounces with water, and add two drachms of chloride of calcium. This stock solution will keep for a long time for use. Dilute one ounce with ten ounces of water.

No. 6.

Toning and Fixing in One Bath.

Chloride of gold	1 grain.
Phosphate of soda	15 grains.
Sulphocyanide of ammonium	25 ,,
Hyposulphite of soda	240 ,,
Water	2 ounces.

Dissolve the gold separately in a small quantity of water, and add it to the other solution.

SOLUTION FOR MOUNTING PRINTS WITHOUT THEIR COCKLING.

Nelson's No. 1 photographic gelatine	4 ounces.
Water	16 ,,
Glycerine	1 ounce.
Methylated alcohol	5 ounces.

Dissolve the gelatine in the water, then add the glycerine, and lastly the spirit.

ENCAUSTIC PASTE.

Pure wax	500 parts.
Gum elemi	10 ,,
Benzole	200 ,,
Essence of lavender	300 ,,
Oil of spike	15 ,,

CHROMOGRAPH MIXTURES.

Make a zinc tray about a quarter of an inch in depth, and pour into it a warm solution made as follows:—

Water	4 ounces.
Sulphate of baryta	2½ ,,
Sugar	1 ounce.
Gelatine	1 ,,
Glycerine	6 ounces.

Write whatever is required to be printed upon a sheet of white paper, using instead of ordinary ink the aniline colour known as "violet of methylaniline;" as soon as the writing is pretty dry lay it upon the gelatine surface and rub the back of the paper with the palm of the hand. The ink will be absorbed by the gelatinous product. All that is to be done in order to obtain a *facsimile* of the writing is to lay a sheet of paper upon the writing on the gelatine and rub the back with the hand. From forty to fifty can thus be drawn off in a few minutes.

INK FOR RUBBER STAMPS.

Aniline red (violet)	90 grains.
Boiling distilled water	1 ounce.
Glycerine	half a teaspoonful
Treacle	half as much as glycerine.

WAXING SOLUTION

FOR GLASS PLATES FOR REMOVING COLLODION FILMS.

No. 1.

Bees'-wax	20 grains.
Benzole rect. No. 1	4 ounces.

FOR FLEXIBLE SUPPORTS (Autotype).

No. 2.

Yellow rosin	3 drachms.
,, bees'-wax	1 drachm.
Rectified spirits of turpentine	10 ounces.

SENSITISING SOLUTION FOR CARBON TISSUE.

Bichromate of potash	1 ounce.
Water	20 ounces.
Liquor ammonia	6 minims.

SOLUTIONS FOR SILVERING GLASS MIRRORS.

MARTIN'S.

A.

Nitrate of silver	175 grains.
Distilled water	10 ounces.

B.

Nitrate of ammonia	262 grains.
Distilled water	10 ounces.

C.

Pure caustic potash	1 ounce (avoirdupois).
Distilled water	10 ounces.

D.

Pure sugar candy	½ ounce (avoirdupois).
Distilled water	5 ounces.

Dissolve and add—

Tartaric acid .... 50 grains.

Boil in a flask for ten minutes, and when cool add—

Alcohol .... 1 ounce.

Distilled water *quant. suff.* to make up to 10 ounces.

For use take equal parts of A and B. Mix together also equal parts of C and D, and mix in another measure. Then mix both these mixtures together in the silvering vessel, and suspend the mirror face downward in the solution.

BURTON'S.

SOLUTION 1.

Nitrate of silver	25 grains.
Distilled water	1 ounce.

SOLUTION 2.

Potash (pure)	25 grains.
Distilled water	1 ounce.

SOLUTION A.

Solution 1 Solution 2	equal parts.
Ammonia	to just dissolve the precipitate.
Solution 1	to just cause a discolouration.

SOLUTION B.

Loaf sugar	2,700 grains.
Distilled water	20 ounces.
Nitric acid	2 drachms.
Alcohol (strong)	10 ounces.
Distilled water to make	80 ,,

For use—

Solution A	1 ounce.
Solution B	1 drachm.

Solution A is subject to slow decomposition; Solution B, on the contrary, improves by keeping.

FREEZING MIXTURES.

THE following mixtures will be found useful where ice is not readily obtainable:—

	Ingredients.	Parts by Weight.	Temperature Produced, Starting at 10° C.	Diminution of Temperature.
1	Water	1	16° C.	26° C.
	Nitrate of ammonia	1		
2	Water	16	12°	22°
	Saltpetre	5		
	Chloride of ammonium (sal ammoniac)	5		
3	Water	1	19°	29°
	Nitrate of ammonia	1		
	Carbonate of soda	1		
4	Snow	5	..	20°
	Chloride of sodium	2	..	..
5	Snow	1	..	45°
	Crystallised chloride of calcium	2	..	..
6	Crystallised sulphate of soda	8	20°	30°
	Hydrochloric acid	5		

DEVELOPING FORMULÆ FOR GELATINE PLATES.

WRATTEN & WAINWRIGHT'S.

ORDINARY.

A.	Pyro. acid	2 grains,	Freshly mixed.
	Water (ordinary)	1 ounce,	
B.	Bromide of potassium	15 grains.	
	Water	1 ounce.	
C.	Liquor ammonia	1 drachm.	
	Water	1 ounce.	

Development.—Lay the exposed plate in the dish in cold water (*hard*, not soft, water) for one minute, during which time pour into the developing cup one ounce of "A." Pour off the water and apply the "A," leaving it also on the film about one minute. Now drop into the cup (say) three minims or drops each of "B" and "C;" return "A" from the plate to the cup, and a perfect admixture will result. Reapply, and in about thirty seconds or so the image will begin to appear, and will gradually progress until the power of the developer is exhausted.

Instantaneous.—Stock Solution A.*

Ammonia liquor fort.	1 ounce.
Potass bromide	60 grains.
Water	3 ounces.

Developer.

Pyrogallic acid	3 grains.
Stock solution A*	20 drops.
Water	2 ounces.

Lay the exposed plate in a dish of cold water to soak while the pyrogallic acid is mixed. For each plate use at least three grains of pyro. diluted with two ounces of water. First pour off the water from the plate and apply the pyro. solution; then add five drops of "Stock Solution A*," and keep this weak developer on the plate until the highest lights are pretty well visible. Then add from fifteen to twenty drops more of "A*" to finish development.

SWAN'S.

Alkaline Pyrogallic Acid Development.—For alkaline pyrogallic acid development we recommend as a good basis, to be modified according to the judgment and experience of the operator, the following:—

No. 1 Solution.

Pyrogallic acid	15 grains.
Water	10 ounces.

No. 2 Solution.

Liquor ammonia (·880 s.g.)	1 ounce.
Bromide of ammonium	1 ,,
Water	½ ,,

These two solutions are to be used in the proportion of one or two drops of No. 2 to each drachm of No. 1. A graduated dropping tube with india-rubber cap is the most convenient means of measuring No. 2 solution. Those who dislike the use of the dropping tube, and prefer to employ solutions which can be mixed in equal proportions, may adopt the following formula:—

No. 1 Solution.

Pyrogallic acid	30 grains.
Water	10 ounces.

No. 2 Solution.

Liquor ammonia (·880 s.g.)	1 drachm.
Bromide of ammonium	1 ,,
Water	10 ounces.

If two ounces of developing mixture be required for developing a certain plate, then in using this second formula one ounce of each—No. 1 and No. 2 solutions—is taken.

NELSON'S.

Make two stock solutions, and label them No. 1 and No. 2.

No. 1.

Pyrogallic acid	1 ounce.
Methylated spirit	7 ounces.
Distilled water	3 ,,
White sugar	1 ounce.

No. 2.

Strong liquid ammonia, ·880	4 ounces.
Water	2 ,,
Bromide of ammonium	1 ounce.
White sugar	½ ,,

Have your developing cup and a four-ounce graduated measure quite clean, also an ebonite or wooden dish varnished with shellac, slightly larger than the plate being used, and two two-drachm minim measures, one of which is kept for No. 1 and the other for No. 2. To develope (say) a half-plate, put half a drachm of No. 1 into the developing glass, then put half a drachm of No. 2 into the graduated measure, and add one and a-half ounce of water. Now lay the plate face upwards in the dish, pour the contents of the graduated measure into the developing cup, and flow the mixture steadily over the surface, avoiding air-bubbles; but should any adhere to the film at once remove them with the finger or clean camel's-hair brush. Gently rock the dish until the details are well out, which, if the exposure have been well timed, should be in about thirty seconds.

This answers equally for the ordinary and extra-rapid plates.

EDWARDS'S.

No. 1.

Pyrogallic acid	1 ounce.
Glycerine	1 ,,
Methylated alcohol	6 ounces.

Mix the glycerine and spirit and add the pyro.

No. 2.

Bromide of potassium (or ammonium)	60 grains.
Liquor ammonia, ·880	1 ounce.
Glycerine	1 ,,
Water	6 ounces.

The above stock solutions will keep any length of time.

To make the developer, add one part of No. 1 to fifteen parts of water, and label this bottle D (developer). In another bottle mix one ounce of No. 2 with fifteen ounces of water, and label it A (accelerator).

For use, mix equal parts of D and A. For under-exposure increase the proportion of A, and *vice versâ*.

THOMAS'S.

The Development.—Prepare the following solutions:—

A. P.

Acid pyrogallic	40 grains.
Distilled water	20 ounces.

A. P. must be freshly prepared.

A. B.

Liquor ammoniæ, s.g. ·800	$\frac{1}{2}$ ounce.
Ammonium bromide	100 grains.
Distilled water	20 ounces.

A. B. will keep several months.

Just a moment before development mix equal parts of the above solutions in sufficient quantity; one ounce of each will be ample for a plate $8\frac{1}{2} \times 6\frac{1}{2}$ in. Pass a broad camel's-hair brush over the plate to remove the slightest particle of dust, place it in a flat porcelain glass or ebonite tray, and flood it dexterously with the developer. The image quickly appears, and, if the correct exposure have been given, attains its full density in about a minute or a minute and a-half; then wash freely with water.

Note.—In case of under- or over-exposure, the development may be considerably modified by the judicious application of the A. P. and A. B. solutions. In case of over-exposure add more of A. P.; for under-exposure more of A. B. *A. P. gives density; A. B. brings out half-tone.*

ROUCH'S.

Make the following solutions:—

A.

Pyrogallic acid	60 grains.
Nitric acid	3 to 5 minims.
Water	20 ounces.

B.

Liquor ammonia, ·880	1 ounce.
Bromide of potassium	2 drachms.
Water	2 ounces.

The solution B should be kept in an ordinary dropping-bottle. The object of nitric acid in the pyro. solution is to give it keeping properties; it may be omitted where only a small quantity of solution is made for immediate use.

INTENSIFYING SOLUTIONS FOR GELATINE NEGATIVES.

EDWARDS'S.

Saturated solution of bichloride of mercury	10 ounces.
Iodide of potassium	10 drachms.

Dissolve the iodide of potassium in ten ounces of water, and pour gradually into the mercurial solution until the precipitate thrown down is *nearly* redissolved. Add one ounce of hyposulphite of soda in crystals.

ANOTHER.

Mercury bichloride	60	grains	in	4	ounces	water.
Iodide of potassium	90	,,	,,	2	,,	,,
Hypo.	120	,,	,,	2	,,	,, Mix.

MR. WILLIAM ENGLAND'S.

Mercuric chloride	20 grains.
Ammonium chloride	20 ,,
Water	1 ounce.

Wash the negative thoroughly after fixing and apply the above until the film acquires a uniformly grey tint. Wash again and apply a very weak solution of ammonia—ten drops of the latter to an ounce of water.

FORMULÆ FOR SILVER INTENSIFICATION.

PYROGALLIC SOLUTION.

Pyro.	15 grains.
Water	10 ounces.

SILVER SOLUTION.

Nitrate of silver	60 grains.
Citric acid	30 ,,
Nitric acid	30 minims.
Water	2 ounces.

To each ounce of the pyro. solution add ten or fifteen minims of the acid silver, having previously thoroughly removed the hypo. from the plate by prolonged washing or by the use of the alum and hydrochloric solution. Should the shadows of the negative become stained during intensification the solution of alum and acid will subsequently clear them almost instantaneously unless the stain be due to the imperfect removal of the hypo. It must be borne in mind that the density increases greatly on drying the negative.

MR. J. DUDLEY RADCLIFFE'S.

Sulphate of iron and ammonia	1 ounce.
Lump sugar	1 ,,
Glacial acetic acid	2 ounces.
Albumen	1 ounce.
Distilled water	20 ounces.

Add the albumen last.

A few drops of a twenty-grain solution of silver nitrate are added at the time of using.

MESSRS. WRATTEN AND WAINWRIGHT'S.

A.

Protosulphate of iron	15 grains.
Gelatino-acetic acid solution (as described below)	40 drops.
Water	1 ounce.

B.

Nitrate of silver	10 grains.
Glacial acetic acid	10 drops.
Water	1 ounce.

The gelatino-acetic acid solution is compounded as under:—

Gelatine	15 grains.
Glacial acetic acid	3 drachms.
Water	5 ,,

It is as well to prepare a stock of this and also of A, as they are both better for keeping.

First flood the plate with water, and then with a solution of iodine and iodide of potassium of the colour of *pale* sherry for one minute; rinse it off and apply enough of A to cover the plate for the same time. Now drop into the cup a drachm of B, and bring the A back from the plate to the cup to mix them together. Re-apply and keep moving over the surface until density is sufficient. If any air-bells should occur they must be kept moving, and then they will do no harm.

HERR JASTRZEMBSKI'S.

No. 1.

Gallic acid	1 part.
Alcohol	10 parts.

No. 2.

Nitrate of silver	1 part.
Water	16 parts.
Acetic acid	¼ to ½ of a part.

Both solutions are stable. Before using, mix one part of solution No. 1 with about four parts of distilled water, and then add a few drops of solution No. 2.

COLONEL WORTLEY'S COLLO-RESTRAINER.

Gelatine	3 drachms.

Soak in water for twenty-four hours; drain off water thoroughly, and add—

Sulphuric acid	7 drachms.

When cold add water seven ounces. Neutralise with liquor ammonia (it will take about two ounces), and then add—

Glycerine	4½ ounces.

TO RESTORE FADED NEGATIVES.

Mr. W. E. Debenham recommends the following solution for the purpose of restoring printing force to negatives which have faded after mercurial intensification:—

Schlippe's salt	10 grains.
Water	1 ounce.

Wet the film thoroughly by soaking in a dish of water, and immerse in the restoring solution until the desired effect is obtained.

TO REMOVE THE LAST TRACES OF HYPO. FROM THE FILM.

Captain Abney recommends the following:—

Peroxide of hydrogen (twenty vols.)	1 drachm.
Water	5 ounces.

After washing the negative well it is immersed for a couple of minutes in the solution and again rinsed in water, when the intensification with silver can be at once proceeded with.

ANOTHER.

Where peroxide of hydrogen is not obtainable the following may be used as a substitute, the solution containing that substance in combination with others:—

Barium dioxide	1 ounce.
Glacial acetic acid	1 ,,
Water	4 ounces.

Reduce the barium dioxide to a fine powder and add it gradually to the acid and water, shaking until dissolved. A few minutes' immersion in this solution will effectually remove or destroy the last traces of hypo.

ANOTHER.

A simple plan brought forward by Captain Abney for this specific purpose consists in employing a saturated solution of alum in place of the solution of hydroxyl or peroxide of hydrogen.

EAU DE JAVELLE.

Dry chloride of lime (hypochlorite of lime) ..	2 ounces.
Carbonate of potash	4 ,,
Water	40 ,,

Mix the chloride of lime with thirty ounces of the water; dissolve the carbonate of potash in the remainder. Mix, boil, and filter.

LABARRAQUE'S SOLUTION.

Chloride of lime	2 ounces.
Carbonate of soda	4 ,,
Water....................................	40 ,,

Mix the chloride of lime with thirty ounces of the water, and dissolve the carbonate of soda in the remainder. Mix, boil, and filter.

CLEARING SOLUTIONS FOR GELATINE NEGATIVES.

MR. J. COWELL'S.

Alum	2 ounces.
Citric acid.................................	1 ounce.
Water.....................................	10 ounces.

Wash moderately after fixing, and immerse the negative in the above.

ANOTHER.

Saturated solution of alum	20 ounces.
Hydrochloric acid (commercial)	1 ounce.

Immerse the negative after fixing, having previously washed it for two or three minutes under the tap; wash well after removal from the alum and acid.

FERROUS CITRO-OXALATE DEVELOPER.

No. 1.	Potassium citrate	700 grains.
	Potassium oxalate........................	200 ,,
	Water	3½ ounces.
No. 2.	Ferrous sulphate	300 grains.
	Water	3½ ounces.

Mix in equal parts.

INLAND PARCELS POST.

Every Post Office is open to the public for Parcels Post business on Week Days during the same hours as for general postal business. On Sundays Parcels Post business is not transacted.

RATES OF POSTAGE AND WEIGHT:—

FOR AN INLAND POSTAL PARCEL of a weight of	The rate of postage, to be prepaid in ordinary postage stamps, is—
Not exceeding 1 lb	3d.
Exceeding 1 lb. and not exceeding 3 lbs.	6d.
,, 3 lbs. ,, ,, 5 lbs.	9d.
,, 5 lbs. ,, ,, 7 lbs.	1s. 0d.

PREPAYMENT OF POSTAGE.—All parcels must be prepaid. LIMITATION OF WEIGHT.—No Parcel exceeding 7 lbs. in weight can be received for transmission by Parcels Post. LIMITATION OF SIZE.—No Parcel may exceed 3 ft. 6 in. in length, or 6 ft. in length and girth combined. POSTING OF PARCELS.—Parcels must be handed in at a Post Office Counter, and must not be dropped into a Letter Box.

TABLE OF THE SYMBOLS, ATOMICITY, ATOMIC, AND EQUIVALENT WEIGHTS OF THE ELEMENTS.

NAME.	Symbol and Atomicity.	Atomic Weight.	Equivalent Weight.
Aluminium	Al^{iii}	27·4	9·13
Antimony (Stibium)	Sb^{iii}	122·0	40·66
Arsenic	As^{iii}	75·0	25·0
Barium	Ba^{ii}	137·0	68·5
Bismuth	Bi^{iii}	208·0	69·33
Boron	B^{iii}	11·0	3·66
Bromine	Br^{i}	80·0	80·0
Cadmium	Cd^{ii}	112·0	56·0
Cæsium	Cs^{i}	133·0	133·0
Calcium	Ca^{ii}	40·0	20·0
Carbon	C^{iv}	12·0	3·0
Cerium	Ce^{ii}	92·0	46·0
Chlorine	Cl^{i}	35·5	35·5
Chromium	Cr^{ii}	52·2	26·1
Cobalt	Co^{ii}	58·8	29·4
Columbium (or Niobium)	Cb^{v}	94·0	18·8
Copper (Cuprum) { Cuprosum	Cu^{i}	63·4	63·4
Cupricum	Cu^{ii}	63·4	31·7
Davyum	Da	. .	. .
Didymium	Di^{ii}	95·0	47·5
Erbium	E^{ii}	112·6	56·3
Fluorine	Fl^{i}	19·0	19·0
Gallium	Ga	68·0	. .
Glucinum	G^{ii}	9·4	4·7
Gold (Aurum)	Au^{iii}	196·0	65·33
Hydrogen	H^{i}	1·0	1·0
Indium	In^{iii}	113·4	37·8
Iodine	I^{i}	127·0	127·0
Iridium	Ir^{iv}	198·0	49·5
Iron (Ferrum) { Ferrosum	Fe^{ii}	56·0	28·0
Ferricum	Fe^{iii}	56·0	18·66
Lanthanum	La^{ii}	92·8	46·4
Lead (Plumbum)	Pb^{ii}	207·0	103·5
Lithium	Li^{i}	7·0	7·0
Magnesium	Mg^{ii}	24·0	12·0
Manganese	Mn^{ii}	55·0	27·5
Mercury (Hydrargyrum) { Mercurosum	Hg	200·0	200·0
Mercuricum	Hg^{ii}	200·0	100·0
Molybdenum	Mo^{ii}	92·0	46·0
Nickel	Ni^{ii}	58·8	29·4
Nitrogen	N^{iii}	14·0	4·66
Osmium	Os^{iv}	199·0	49·75
Oxygen	O^{ii}	16·0	8·0
Palladium	Pd^{ii}	106·5	53·25

TABLE OF SYMBOLS, &c.—Continued.

Name.		Symbol and Atomicity.	Atomic Weight.	Equivalent Weight.
Phosphorous		P^{iii}	31·0	10·33
Platinum	Platinosum	Pt^{ii}	197·4	98·7
	Platinicum	Pt^{iv}	197·4	49·35
Potassium (Kalium)		K	39·1	39·1
Rhodium		Rh^{ii}	104·4	52·2
Rubidium		Rb^{i}	85·4	85·4
Ruthenium		Ru^{iv}	104·0	26·0
Selenium		Se^{ii}	79·4	39·7
Silicium (or Silicon)		Si^{iv}	28·0	7·0
Silver (Argentum)		Ag^{i}	108·0	108·0
Sodium (Natrium)		Na^{i}	23·0	23·0
Strontium		Sr^{ii}	87·5	43·75
Sulphur		S^{ii}	32·0	16·0
Tantalum		Ta^{v}	182·0	36·4
Tellurium		Te^{ii}	128·0	64·0
Thallium		Te^{i}	204·0	204·0
Thorium (or Thorinum)		Th^{iv}	231·5	57·87
Tin (Stannum)	Stannosum	Sn^{ii}	118·0	59·0
	Stannicum	Sn^{iv}	118·0	29·5
Titanium		Ti^{iv}	50·0	12·5
Tungsten (Wolfram)		W^{iv}	184·0	46·0
Uranium		Ur^{ii}	120·0	60·0
Vanadium		V^{iii}	51·3	17·1
Yttrium		Y^{ii}	61·7	30·85
Zinc		Zn^{ii}	65·2	32·6
Zirconium		Zr^{iv}	89·6	22·4

RATES OF POSTAGE FOR INLAND LETTERS.

The rates of postage to be prepaid are as follow, viz. :—

For a letter not exceeding 1 oz.						1d.
,,	exceeding 1 oz., but not exceeding 2 oz.					1½d.
,,	,,	2	,,	,,	4 ,,	2d.
,,	,,	4	,,	,,	6 ,,	2½d.
,,	,,	6	,,	,,	8 ,,	3d.
,,	,,	8	,,	,,	10 ,,	3½d.
,,	,,	10	,,	,,	12 ,,	4d.

A letter exceeding the weight of 12 ozs. is liable to the postage of 1d. for every ounce, or fraction of an ounce, beginning with the first ounce.

TABLE OF SYMBOLS OF THE MORE IMPORTANT COMPOUNDS USED IN PHOTOGRAPHY.

NAME.	SYMBOL.	
Acid, Acetic (Cryst.)	$H, C_2 H_3 O_2$	60
,, Citric	$H_3, C_6 H_5 O_7 + H_2 O$	210
,, Formic	H, CHO_2	46
,, Gallic	$H, C_7 H_5 O_5$	170
,, Hydriodic	HI	128
,, Hydrobromic	$H Br$	81
,, Hydrochloric	$H Cl$	36·5
,, Hydrocyanic	$H CN$	27
,, Hydrosulphuric	$H_2 S$	34
,, Nitric	H, NO_3	63
,, Oxalic	$H_2 C_2 O_4 + 2 H_2 O$	126
,, Pyrogallic	$H_3 C_6 H_3 O_3$	126
,, Sulphuric	$H_2 SO_4$	98
,, Sulphurous	$H_2 S O_3$	82
,, Tannic	$H_4 C_{27} H_{18} O_{17}$	618
,, Tartaric	$H_4 C_4 H_2 O_6$	150
Alum (Potash)	$Al K (SO_4)_2 12 H_2 O$	474·5
Ammonium, Bromide	$NH_4 Br$	98
,, Carbonate	$(NH_4)_2 CO_3$	96
,, Chloride	$NH_4 Cl$	53·5
,, Iodide	$NH_4 I$	145
,, Nitrate	NH_4, NO_3	80
,, Sulphydrate of	NH_4, HS	51
,, Sulphocyanide of	NH_4, CNS	76
Barium, Bromide	$Ba Br_2$	297
,, Chloride (Cryst.)	$Ba, Cl_2 + 2 H_2 O$	244
,, Iodide	$Ba I_2$	391
,, Nitrate	$Ba, (NO_3)_2$	261
Cadmium, Bromide (Cryst.)	$Cd, Br_2 + 4 H_2 O$	344
,, Chloride	$Cd Cl_2$	183
,, Iodide	$Cd I_2$	366
Calcium Bromide (Cryst.)	$Ca Br_2 + 4 H_2 O$	272
,, Carbonate	$Ca CO_3$	100
,, Chloride	$Ca Cl_2$	111
,, Iodide	$Ca I_2$	294
Copper, Bromide (cupric)	$Cu Br_2$	223·4
,, Chloride ,,	$Cu Cl_2 + Aq$	
,, Sulphate ,,	$Cu SO_4$	159·4
Gold, Terchloride	$Au Cl_3$	302·5
Iron, Chloride (ferrous)	$Fe Cl_2$	127
,, ,, (ferric)	$Fe_2 Cl_6$	325
,, Iodide	$Fe I_2$	310
,, Nitrate	$Fe (NO_3)_2 + 6 H_2 O$	288
,, Oxalate (ferrous)	$Fe C_2 O_4$	144
,, ,, (ferric)	$Fe_2 (C_2 O_4)_3$	376
,, Sulphate (ferrous)	$Fe SO_4 + 7 H_2 O$	278
,, ,, (ferric)	$Fe_2 (SO_4)_3$	400
,, Ammonia-sulphate	$Fe SO_4 . (NH_4)^2 SO_4 + 6 H_2 O$	392

TABLE OF SYMBOLS, &c.—CONTINUED.

NAME.	SYMBOL.	
Lead, Acetate (Cryst.)	$Pb, (C_2 H_3 O_2)_2 + H_2 O$	343
,, Nitrate	$Pb, (NO_3)_2$	331
Lithium, Bromide	$Li Br$	87
,, Chloride	$Li Cl$	42·5
,, Iodide	$Li I$	134
Magnesium, Bromide	$Mg Br_2$	184
,, Chloride	$Mg Cl_2$	95
,, Iodide	$Mg I_2$	278
Mercury, Chloride (Mercuric)	$Hg Cl_2$	271
Platinum, Chloride	$Pt Cl_4$	339
Potassium, Bichromate	$K_2 Cr_2 O_7$	294·6
,, Bromide	$K Br$	119·1
,, Carbonate	$K_2 CO_3$	138·2
,, Chloride	$K Cl$	74·6
,, Citrate	$K_3 C_6 H_5 O_7 + H_2 O$	324·3
,, Cyanide	$K C N$	65·1
,, Hydrate	$K OH$	56·1
,, Iodide	$K I$	166·1
,, Nitrate	$K NO_3$	101·1
,, Permanganate	$K_2 Mn_2 O_8$	316·2
Silver, Acetate	$Ag C_2 H_3 O_2$	167
,, Bromide	$Ag Br$	188
,, Carbonate	$Ag_2 CO_3$	276
,, Chloride	$Ag Cl$	143·5
,, Citrate	$Ag_3 C_6 H_5 O_7$	513
,, Fluoride	$Ag Fl$	127
,, Iodide	$Ag I$	235
,, Nitrate	$Ag NO_3$	170
,, Oxalate	$Ag_2 C_2 O_4$	304
,, Oxide	$Ag_2 O$	232
,, Sulphide	$Ag_2 S$	248
Sodium, Acetate (Cryst.)	$Na C_2 H_3 O_2 + 6 Aq$	190
,, Biborate (Borax)	$Na_2 B_4 O_7 + 10 H_2 O$	382
,, Bromide	$Na Br$	103
,, Carbonate (Cryst.)	$Na_2 CO_3 + 10 H_2 O$	286
,, Chloride	$Na Cl$	58·5
,, Citrate	$Na_3 C_6 H_5 O_7$	258
,, Hyposulphite (Cryst.)	$Na_2 S_2 O_3 + 5 H_2 O$	248
,, Iodide	$Na I$	150
,, Nitrate	$Na NO_3$	85
,, Sulphite	$Na_2 SO_3$	126
Strontium, Bromide	$Sr Br_2$	247·6
,, Chloride	$Sr Cl_2$	158·6
,, Iodide	$Sr I_2$	341·6
Uranium, Bromide	$U Br_2\ 4\ H_2 O$	352
,, Nitrate	$(Ur O_2), (NO_3)_2 + 6 H_2 O$	384
Zinc, Bromide	$Zn Br_2$	225·2
,, Chloride	$Zn Cl_2$	136·2
,, Iodide	$Zn I_2$	319·2

TABLE OF THE SOLUBILITIES OF THE PRINCIPAL SUBSTANCES USED IN PHOTOGRAPHY.

	One part is soluble in — parts of water.		100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
	Cold.	Boiling		
Acid, Boracic (Anhydrous)	47·01	..	2·13	soluble
,, ,, (Cryst.)....	25·66	3·0	3·9	sol. in 6 parts @ 60°
,, Citric	0·75	0·5	133·0	sol. in 1·15 pt. s.g. 820
,, Gallic	100·0	3·0	1·0	soluble in 4 parts
,, Oxalic............	15·5	1·0	6·47	insoluble
,, Pyrogallic	2·25	..	..	sol. in alc. and ether
,, Salicylic	87·2	vry sol	0·35	easily soluble
,, Succinic	5·0	2·2	20·0	soluble in 3 parts
,, Tannic	very	solubl	e	sol. in alc. and ether
,, Tartaric	·66	·5	150·0	soluble
Alum (Potash)	10·5	vry sol	9·52	insoluble
,, (Ammonia)	7·32	,,	13·66	,,
Ammonium, Bromide	1·4	0·78	41·1	sol. in 32·3 parts
,, Carbonate....	3·3	·833	33·0	insoluble
,, Chloride	2·7	1·00	37·02	sparingly soluble
,, Citrate	deliqu	escent	vy.sol.	less sol. in alcohol
,, Iodide	very	solubl	e	soluble
,, Nitrate	2·0	1·0	50·0	feebly soluble
,, Salicylate	very	solubl	e	
,, Succinate	,,	,,		
,, Sulphocyanide	deliqu	escent,	easily	sol. in water and alc.
Barium, Bromide	·96	..	104·2	easily soluble
,, Chloride { Crystallised	2·18	..	46·0	very slightly soluble
,, Chloride { Anhydrous.	2·862	..	34·1	
,, Iodide	0·48	0·35	208·3	easily soluble
,, Nitrate	12·2	2·84	8·18	
Cadmium, Bromide	easily	solubl	e	easily soluble
,, Chloride	0·71	0·67	..	,,
,, Iodide	1·08	0·75	92·6	very soluble
Calcium, Bromide (Cryst.)	0·97	..	102·56	easily soluble
,, Chloride	0·25	any qy	400·0	
,, Iodide	deliqu	escent		
Cobalt, Chloride	very	solubl	e	sol. in alc. and ether
Copper, Bromide (Cupric).	deliqu	escent	vy.sol.	,, ,,
,, Chloride ,,	,,	,,	,,	,, ,,
,, Nitrate...........	solubl	e	..	very soluble
,, Sulphate	2·5	..	40·0	insoluble
Gold, Perchloride........	deliqu	escent	vy.sol.	soluble in ether
Iron, Chloride (Ferrous) { Anhyd.	2·0	..	50·0	sol. in 1 part alcohol
Iron, Chloride (Ferrous) { Hydrated	0·68	..	147·0	easily soluble

TABLE OF THE SOLUBILITIES, &c.—CONTINUED.

	One part is soluble in — parts of water.		100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
	Cold.	Boiling.		
Iron, Chloride (Ferric) ..	very	del. &	sol.	very soluble
,, Oxalate ,,	insolu	ble, ex	cept in	excess of oxalic acid
,, Sulphate ,,	solubl	e	..	soluble
,, ,, (Ferrous) ..	1·3	·30	77·0	insoluble
Lead, Acetate	3·7	3·45	27·0	soluble in 12·5 parts
,, Nitrate	7·7	..	13·0	
Lithium, Bromide	0·66	..	149·8	soluble
,, Chloride	1·315	..	76·0	
,, Iodide	0·61	..	164·0	
Magnesium, Bromide	deliqu	escent	vy.sol.	very soluble
,, Chloride	1·857	..	53·8	
,, Iodide	deliqu	escent	vy.sol.	soluble
,, Sulphate	1·47	0·66	68·04	slightly soluble
Mercury, Chloride (Mercuric)	16·0	3·0	6·25	soluble in 2·35 parts
Platinum, Bichloride ...	solubl	e	..	easily sol. in alc.& ether
Potassium, Bichromate ..	10·0	..	10·0	
,, Bromide	1·55	..	64·5	
,, Carbonate	0·9	..	111·0	
,, Chloride	3·03	2·0	33·0	slightly soluble
,, Citrate	very	solubl	e	
,, Cyanide........	deliqu	escent	vy.sol.	insol. in pure alcohol
,, Ferrocyanide ..	3·0	1·0	33·3	insoluble
,, Ferricyanide ..	2·54	1·22	39·37	very sparingly sol.
,, Hydrate	0·5	..	200·0	very soluble
,, Iodide	0·7	0·27	143·0	sol. in 40 pts. abs. alc.
,, Nitrate	3·5	0·4	28·57	insoluble
,, Nitrite	deliqu.	& solu	ble	
,, Oxalate (neutral)	3·0	..	33·3	slightly soluble
,, ,, (bin.) ..	40·0	..	2·5	insoluble
,, ,, (quad.)..	20·17	..	4·95	,,
,, Permanganate ..	16·0	..	6·25	insoluble
,, Sulphocyanide ..				
Silver, Acetate	very	slight	ly sol.	
,, Citrate	solubl	e in w	arm w	ater
,, Fluoride	deliqu	escent		
,, Nitrate	1·0	0·5	100·0	sol. in 4 pts. boiling alc
,, Nitrite	300·0	dissol. easily	0·33	insoluble
,, Oxalate	spar'ly sol.	solubl	e	insoluble

TABLE OF THE SOLUBILITIES, &c.—CONTINUED.

	One part is soluble in — parts of water. Cold.	Boiling.	100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
Silver, Sulphate	200·0	88·0	0·5	insoluble
Sodium, Acetate (Cryst.)..	2·86	·66	35·0	
,, Biborate (Borax).	12·44	2·0	8·033	insoluble
,, Bromide........	1·13	..	88·5	
,, Carbonate (Cryst.)	2·0	1·0	50·0	insoluble
,, ,, (Anhyd.)	3·85	2·07	25·93	,,
,, Chloride........	2·77	2·77	36·0	sparingly soluble
,, Citrate	1·0	..	100·0	,, ,,
,, Hydrate.........	1·65	..	60·53	easily soluble
,, Hyposulphite.. (Thiosulphite)	deliqu	escent	vy.sol.	insoluble
,, Iodide..........	0·55	0·3	180·0	sparingly soluble
,, Nitrate	1·136	..	88·03	sol. in 37 parts alc.
,, Nitrite	deliqu	escent	vy.sol.	very soluble
,, Phosphate	4·0	2·0	25·0	
,, Succinate	very	solubl	e	
,, Sulphate........	2·08	0·41	48·0	soluble
,, Sulphite	4·0	..	25·0	slightly soluble
,, Bisulphite	very	solubl	e	insoluble
,, Sulphocyanide ..				
,, Tartrate........	1·75	..	56·37	insoluble
,, Tungstate	4·0	2·0	25·0	
Strontium, Bromide......	1·01	..	99·0	sparingly soluble
,, Chloride......	1·88	..	53·0	feebly soluble
,, Iodide	0·56	0·27	178·5	
Uranium, Bromide .... (Hydrated).	deliqu	& solu	ble	soluble
,, Nitrate........	0·5	..	200·0	sol. in alc. and ether
,, Oxalate	nearly insol.	30·0	..	insoluble
Zinc, Bromide	deliqu	escent	vy.sol.	very soluble
,, Chloride	0·333	..	300·0	,, ,,
,, Iodide	vy. de.	liques.	& sol.	,, ,,

Percentage of Real Ammonia contained in Solution of different Densities, and their Boiling Points.—DALTON.

Specific Gravity.	Percentage Ammonia.	Boiling Point. Cent.	Specific Gravity.	Percentage Ammonia.	Boiling Point. Cent.	Specific Gravity.	Percentage Ammonia.	Boiling Point. Cent.
0·85	35·3	−4°	0·90	22·2	30°	0·95	10·5	63°
0·86	32·6	+3°·5	0·91	19·8	37°	0·96	8·3	70°
0·87	29·9	10°	0·92	17·4	44°	0·97	6·2	79°
0·88	27·3	17°	0·93	15·1	50°	0·98	4·1	87°
0·89	24·7	23°	0·94	12·8	57°	0·99	2·0	92°

ALCOHOL.

Specific Gravities of Mixtures of Different Proportions of Alcohol (s.g. ·7932) and Water, by Weight and by Volume, at 14° R. (63·5° F.) Meissner.

Parts of		Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.	Parts of		Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.
Alcohol	Water.			Alcohol	Water.		
100	0	0·7932	0·7932	49	51	0·9196	0·9324
99	1	0·796	0·7969	48	52	0·9219	0·9344
98	2	0·7988	0·8006	47	53	0·9242	0·9364
97	3	0·8016	0·8042	46	54	0·9264	0·9384
96	4	0·8045	0·8078	45	55	0·928	0·9404
95	5	0·8074	0·8114	44	56	0·9308	0·9424
94	6	0·8104	0·815	43	57	0·9329	0·9443
93	7	0·8135	0·8185	42	58	0·9350	0·9461
92	8	0·8166	0·8219	41	59	0·9371	0·9478
91	9	0·8196	0·8253	40	60	0·9391	0·9495
90	10	0·8225	0·8286	39	61	0·9410	0·9512
89	11	0·8252	0·8317	38	62	0·9429	0·9529
88	12	0·8279	0·8346	37	63	0·9448	0·9547
87	13	0·8304	0·8373	36	64	0·9467	0·9564
86	14	0·8329	0·840	35	65	0·9486	0·958
85	15	0·8353	0·8427	34	66	0·9505	0·9595
84	16	0·8376	0·8454	33	67	0·9524	0·9609
83	17	0·8399	0·8481	32	68	0·9543	0·9621
82	18	0·8422	0·8508	31	69	0·9561	0·9632
81	19	0·8446	0·8534	30	70	0·9578	0·9643
80	20	0·847	0·8561	29	71	0·9594	0·9654
79	21	0·8494	0·8596	28	72	0·9608	0·9665
78	22	0·8519	0·8616	27	73	0·9621	0·9676
77	23	0·8543	0·8642	26	74	0·9634	0·9688
76	24	0·8567	0·8668	25	75	0·9647	0·970
75	25	0·859	0·8695	24	76	0·966	0·9712
74	26	0·8613	0·8723	23	77	0·9673	0·9723
73	27	0·8635	0·8751	22	78	0·9686	0·9734
72	28	0·8657	0·8779	21	79	0·9699	0·9745
71	29	0·868	0·8806	20	80	0·9712	0·9756
70	30	0·8704	0·8833	19	81	0·9725	0·9766
69	31	0·8729	0·886	18	82	0·9738	0·9775
68	32	0·8755	0·8885	17	83	0·9751	0·9784
67	33	0·8781	0·891	16	84	0·9763	0·9793
66	34	0·8806	0·8934	15	85	0·9795	0·9803
65	35	0·8831	0·8958	14	86	0·9786	0·9813
64	36	0·8855	0·8982	13	87	0·9796	0·9823
63	37	0·8879	0·9096	12	88	0·9806	0·9834
62	38	0·8902	0·9029	11	89	0·9817	0·9846
61	39	0·8925	0·9052	10	90	0·9830	0·9859
60	40	0·8948	0·9075	9	91	0·9844	0·9873
59	41	0·8971	0·9098	8	92	0·9860	0·9888
58	42	0·8994	0·9121	7	93	0·9878	0·9901
57	43	0·9016	0·9145	6	94	0·9897	0·9915
56	44	0·9038	0·9168	5	95	0·9914	0·9929
55	45	0·9060	0·9191	4	96	0·9931	0·9943
54	46	0·9082	0·9214	3	97	0·9948	0·9957
53	47	0·9104	0·9237	2	98	0·9965	0·9971
52	48	0·9127	0·9259	1	99	0·9982	0·9985
51	49	0·915	0·9281	0	100	1·0000	1·0000
50	50	0·9173	0·9303	—	—	—	—

NITRIC ACID.

QUANTITIES of liquid and of anhydrous acid contained in mixtures of nitric acid and water at different densities (Ure—60° Fahr.).

Specific gravity.	Liquid acid, s.g. 1·5, in 100.	Anhydrous acid in 100.	Specific gravity.	Liquid acid, s.g. 1·5, in 100.	Anhydrous acid in 100.	Specific gravity.	Liquid acid, s.g. 1·5, in 100.	Anhydrous acid in 100.
1·5	100	79·7	1·378	66	52·602	1·189	33	26·301
1·498	99	78·903	1·373	65	51·805	1·183	32	25·504
1·496	98	78·106	1·368	64	51·068	1·177	31	24·707
1·494	97	77·309	1·363	63	50·211	1·171	30	23·9
1·491	96	76·512	1·358	62	49·414	1·165	29	23·113
1·488	95	75·715	1·353	61	48·617	1·159	28	22·316
1·485	94	74·918	1·348	60	47·82	1·153	27	21·579
1·482	93	74·121	1·343	59	47·023	1·146	26	20·722
1·479	92	73·324	1·338	58	46·226	1·14	25	19·925
1·476	91	72·527	1·332	57	45·429	1·134	24	19·128
1·473	90	71·73	1·327	56	44·632	1·129	23	18·331
1·47	89	70·933	1·322	55	43·835	1·123	22	17·534
1·467	88	70·136	1·316	54	43·038	1·117	21	16·737
1·464	87	69·339	1·311	53	42·241	1·111	20	15·94
1·46	86	68·542	1·306	52	41·444	1·105	19	15·143
1·457	85	67·745	1·3	51	40·647	1·099	18	14·346
1·453	84	66·948	1·295	50	39·85	1·093	17	13·549
1·45	83	66·155	1·289	49	39·053	1·088	16	12·752
1·446	82	65·354	1·283	48	38·256	1·082	15	11·955
1·442	81	64·557	1·276	47	37·459	1·076	14	11·158
1·438	80	63·760	1·27	46	36·662	1·071	13	10·361
1·435	79	62·963	1·264	45	35·865	1·065	12	9·564
1·431	78	62·166	1·258	44	35·068	1·059	11	8·767
1·427	77	61·369	1·252	43	34·271	1·054	10	7·97
1·423	76	60·572	1·246	42	33·474	1·048	9	7·173
1·419	75	59·775	1·24	41	32·677	1·043	8	6·376
1·415	74	58·978	1·234	40	31·88	1·037	7	5·579
1·411	73	58·181	1·228	39	31·083	1·032	6	4·782
1·406	72	57·384	1·221	38	30·286	1·027	5	3·985
1·402	71	56·587	1·215	37	29·489	1·021	4	3·188
1·398	70	55·79	1·208	36	28·692	1·016	3	2·391
1·395	69	54·993	1·202	35	27·895	1·011	2	1·594
1·388	68	54·196	1·196	34	27·098	1·005	1	0·797
1·383	67	53·399						

SULPHURIC ACID.

Quantities of liquid and Anhydrous Acid in mixtures of sulphuric acid and water at different densities.

Specific gravity.	Liquid acid, s.g. 1·8485, in 100.	Anhydrous acid in 100.	Specific gravity.	Liquid acid, s.g. 1·8485, in 100.	Anhydrous acid in 100.	Specific gravity.	Liquid acid, s.g. 1·8485, in 100.	Anhydrous acid in 100.
1·8485	100	81·54	1·5503	66	53·82	1·2409	33	26·91
1·8475	99	80·72	1·5390	65	53·30	1·2334	32	26·09
1·346	98	79·9	1·5280	64	52·18	1·2260	31	25·28
1·8439	97	79·09	1·5170	63	51·37	1·2184	30	24·46
1·841	96	78·28	1·5066	62	50·55	1·2108	29	23·65
1·8376	95	77·46	1·4960	61	49·74	1·2032	28	22·83
1·8336	94	76·65	1·4860	60	48·92	1·1956	27	22·01
1·829	93	75·83	1·4760	59	48·11	1·1876	26	21·20
1·8233	92	75·02	1·4660	58	47·29	1·1792	25	20·38
1·8179	91	74·20	1·4560	57	46·48	1·1706	24	19·57
1·8115	90	73·39	1·4460	56	45·66	1·1626	23	18·75
1.8043	89	72·57	1·4360	55	44·85	1·1549	22	17·94
1·7962	88	71·75	1·4265	54	44·03	1·1480	21	17·12
1·7870	87	70·94	1·4170	53	43·22	1·1410	20	16·31
1·7774	86	70·12	1·4073	52	42·40	1·1330	19	15·49
1·7673	85	69·31	1·3977	51	41·58	1·1246	18	14·68
1·7570	84	68·49	1·3884	50	40·77	1·1165	17	13·86
1·7465	83	67·68	1·3788	49	39·95	1·1090	16	13·05
1·7360	82	66·86	1·3697	48	39·14	1·1019	15	12·23
1·7245	81	66·05	1·3612	47	38·32	1·0953	14	11·41
1·7100	80	65·23	1·3530	46	37·51	1·0887	13	10·60
1·6993	79	64·42	1·3440	45	36·69	1·0809	12	9·78
1·6870	78	63·6	1·3345	44	35·88	1·0743	11	8·97
1·6750	77	62·78	1·3255	43	35·06	1·0682	10	8·15
1·6630	76	61·97	1·3165	42	34·25	1·0614	9	7·34
1·6520	75	61·15	1·3080	41	33·43	1·0544	8	6·52
1·6415	74	60·34	1·2999	40	32·61	1·0477	7	5·71
1·6321	73	59·52	1·2913	39	31·80	1·0405	6	4·89
1·6204	72	58·71	1·2826	38	30·98	1·0336	5	4·08
1·6090	71	57·89	1·2740	37	30·17	1·0268	4	3·26
1·5975	70	57·08	1·2654	36	29·35	1·0206	3	2·45
1·5868	69	56·26	1·2572	35	28·54	1·0140	2	1·63
1·5760	68	55·45	1·2490	34	27·72	1·0074	1	0·82
1·5648	67	54·63						

HYDROCHLORIC ACID.

Quantities of Liquid and of Anhydrous Acid and of Chlorine in mixtures of Hydrochloric Acid and Water at different Densities.

Specific Gravity.	Liquid Acid s.g. 1·20 in 100.	H. Cl. in 100.	Cl. in 100.	Specific Gravity.	Liquid Acid s.g. 1·20 in 100.	H. Cl. in 100.	Cl. in 100.
1·2000	100	40·777	39·675	1·1000	50	20·388	19·837
1·1982	99	40·369	39·278	1·0980	49	19·980	19·440
1·1964	98	39·961	38·882	1·0960	48	19·572	19·044
1·1946	97	39·554	38·485	1·0939	47	19·165	18·647
1·1928	96	39·146	38·089	1·0919	46	18·757	18·250
1·1910	95	38·738	37·692	1·0899	45	18·349	17·854
1·1893	94	38·330	37·296	1·0879	44	17·941	17·457
1·1875	93	37·923	36·900	1·0859	43	17·534	17·060
1·1857	92	37·516	36·503	1·0838	42	17·126	16·664
1·1846	91	37·108	36·107	1·0818	41	16·718	16·217
1·1822	90	36·700	35·707	1·0798	40	16·310	15·870
1·1802	89	36·292	35·310	1·0778	39	15·902	15·474
1·1782	88	35·884	34·913	1·0758	38	15·494	15·077
1·1762	87	35·476	34·517	1·0738	37	15·087	14·680
1·1741	86	35·068	34·121	1·0718	36	14·679	14·284
1·1721	85	34·660	33·724	1·0697	35	14·212	13·887
1·1701	84	34·252	33·328	1·0677	34	13·863	13·490
1·1681	83	33·845	32·931	1·0657	33	13·456	13·094
1·1661	82	33·437	32·535	1·0637	32	13·049	12·697
1·1641	81	33·027	32·136	1·0617	31	12·641	12·300
1·1620	80	32·621	31·746	1·0597	30	12·230	11·903
1·1599	79	32·213	31·343	1·0577	29	11·825	11·506
1·1578	78	31·805	30·946	1·0557	28	11·418	11·109
1·1557	77	31·398	30·550	1·0537	27	11·010	10·712
1·1537	76	30·990	30·153	1·0517	26	10·602	10·316
1·1515	75	30·582	29·757	1·0497	25	10·194	9·919
1·1494	74	30·174	29·361	1·0477	24	9·786	9·522
1·1473	73	29·767	28·964	1·0457	23	9·379	9·136
1·1452	72	29·359	28·567	1·0437	22	8·971	8·729
1·1431	71	28·951	28·171	1·0417	21	8·563	8·332
1·1410	70	28·544	27·772	1·0397	20	8·155	7·935
1·1389	69	28·136	27·736	1·0377	19	7·747	7·538
1·1369	68	27·728	26·979	1·0357	18	7·340	7·141
1·1349	67	27·321	26·583	1·0337	17	6·932	6·745
1·1328	66	26·913	26·186	1·0318	16	6·524	6·348
1·1308	65	26·505	25·789	1·0298	15	6·116	5·951
1·1287	64	26·098	25·392	1·0279	14	5·709	5·554
1·1267	63	25·690	24·996	1·0259	13	5·301	5·158
1·1247	62	25·282	24·599	1·0239	12	4·893	4·762
1·1226	61	24·874	24·202	1·0220	11	4·486	4·362
1·1206	60	24·466	23·805	1·0200	10	4·078	3·968
1·1185	59	24·058	23·408	1·0180	9	3·670	3·571
1·1164	58	23·650	23·012	1·0160	8	3·262	3·174
1·1143	57	23·242	22·615	1·0140	7	2·854	2·778
1·1123	56	22·834	22·218	1·0120	6	2·447	2·381
1·1102	55	22·426	21·822	1·0100	5	2·039	1·984
1·1082	54	22·019	21·425	1·0080	4	1·631	1·588
1·1061	53	21·611	21·028	1·0060	3	1·224	1·191
1·1041	52	21·203	20·632	1·0040	2	0·816	0·795
1·1020	51	20·796	20·236	1·0020	1	0·408	0·397

ACETIC ACID,

Quantities of Crystallisable Acid in mixtures of Acetic Acid and Water of various Densities at 15° C.

Parts of Crystallisable Acid in 100.	Specific Gravity.	Parts of Crystallisable Acid in 100.	Specific Gravity.	Parts of Crystallisable Acid in 100.	Specific Gravity.	Parts of Crystallisable Acid in 100.	Specific Gravity.
100	1·0553	75	1·0746	50	1·0615	25	1·0350
99	1·0580	74	1·0744	49	1·0607	24	1·0337
98	1·0604	73	1·0742	48	1·0598	23	1·0324
97	1·0625	72	1·0740	47	1·0589	22	1·0311
96	1·0644	71	1·0737	46	1·0580	21	1·0298
95	1·0660	70	1·0733	45	1·0571	20	1·0284
94	1·0674	69	1·0729	44	1·0562	19	1·0270
93	1·0686	68	1·0725	43	1·0552	18	1·0256
92	1·0696	67	1·0721	42	1·0543	17	1·0242
91	1·0705	66	1·0717	41	1·0533	16	1·0228
90	1·0713	65	1·0712	40	1·0523	15	1·0214
89	1·0720	64	1·0707	39	1·0513	14	1·0201
88	1·0726	63	1·0702	38	1·0502	13	1·0185
87	1·0731	62	1·0697	37	1·0492	12	1·0171
86	1·0736	61	1·0691	36	1·0481	11	1·0157
85	1·0739	60	1·0685	35	1·0470	10	1·0142
84	1·0742	59	1·0679	34	1·0459	9	1·0127
83	1·0744	58	1·0673	33	1·0447	8	1·0113
82	1·0746	57	1·0666	32	1·0436	7	1·0098
81	1·0747	56	1·0660	31	1·0424	6	1·0083
80	1·0748	55	1·0653	30	1·0412	5	1·0067
79	1·0748	54	1·0646	29	1.0400	4	1·0052
78	1·0748	53	1·0638	28	1·0388	3	1·0037
77	1·0748	52	1·0631	27	1·0375	2	1·0022
76	1·0747	51	1·0623	26	1·0363	1	1·0007

N.B.—The density of the mixture increases until nearly 25 $^0/_0$ of water is present, after which it again decreases. Acetic acid is therefore better tested volumetrically with a standard solution of alkali.

SULPHUROUS ACID.

Quantities of Anhydrous Sulphurous Acid in solutions of different Densities. F. Authon.

Specific Gravity	Anhydrous Acid in 100.	Specific Gravity	Anhydrous Acid in 100.	Specific Gravity	Anhydrous Acid in 100.	Specific Gravity	Anhydrous Acid in 100.
1·046	9·54	1·027	6·68	1·020	4·77	1·013	2·86
1·036	8·59	1·023	5·72	1·016	3·82	1·009	1·90
1·031	7·63	—	—	—	—	1·005	0·95

FRENCH FLUID MEASURES.

The cubic centimètre, usually represented by "c. c.," is the unit of the French measurement for liquids. It contains nearly seventeen minims of water; in reality, it contains 16·896 minims. The weight of this quantity of water is one gramme. Hence it will be seen that the cubic centimètre and the gramme bear to each other the same relation as our drachm for solids and the drachm for fluids, or as the minim and the grain. The following table will prove to be sufficiently accurate for photographic purposes:—

1	cubic centimètre	=	17	minims (as near as possible).							
2	cubic centimètres	=	34	,,							
3	,,	=	51	,,							
4	,,	=	68	,,	or			1	drachm	8	minims.
5	,,	=	85	,,	,,			1	,,	25	,,
6	,,	=	102	,,	,,			1	,,	42	,,
7	,,	=	119	,,	,,			1	,,	59	,,
8	,,	=	136	,,	,,			2	drachms	16	,,
9	,,	=	153	,,	,,			2	,,	33	,,
10	,,	=	170	,,	,,			2	,,	50	,,
20	,,	=	340	,,	,,			5	,,	40	,,
30	,,	=	510	,,	,,	1	ounce	0	drachm	30	minims.
40	,,	=	680	,,	,,	1	,,	3	drachms	20	,,
50	,,	=	850	,,	,,	1	,,	6	,,	10	,,
60	,,	=	1020	,,	,,	2	ounces	1	,,	0	,,
70	,,	=	1190	,,	,,	2	,,	3	,,	50	,,
80	,,	=	1360	,,	,,	2	,,	6	,,	40	,,
90	,,	=	1530	,,	,,	3	,,	1	,,	30	,,
100	,,	=	1700	,,	,,	3	,,	4	,,	20	,,

THE CONVERSION OF FRENCH INTO ENGLISH WEIGHT.

Although a gramme is equal to 15·4346 grains, the decimal is one which can never be used by photographers; hence in the following table it is assumed to be $15\frac{2}{5}$ grains, which is the nearest approach that can be made to *practical* accuracy:—

1	gramme	=	$15\frac{2}{5}$	grains.						
2	grammes	=	$30\frac{4}{5}$	,,						
3	,,	=	$46\frac{1}{5}$	,,						
4	,,	=	$61\frac{3}{5}$	,,	……	or	1	drachm	$1\frac{3}{5}$	grain.
5	,,	=	77	,,	……	,,	1	,,	17	grains.
6	,,	=	$92\frac{2}{5}$	,,	……	,,	1	,,	$32\frac{2}{5}$	,,
7	,,	=	$107\frac{4}{5}$	,,	……	,,	1	,,	$47\frac{4}{5}$	,,
8	,,	=	$123\frac{1}{5}$	,,	……	,,	2	drachms	$3\frac{1}{5}$	,,
9	,,	=	$138\frac{3}{5}$	,,	……	,,	2	,,	$18\frac{3}{5}$	,,
10	,,	=	154	,,	……	,,	2	,,	34	,,
11	,,	=	$169\frac{2}{5}$	,,	……	,,	2	,,	$49\frac{2}{5}$	,,
12	,,	=	$184\frac{4}{5}$	,,	……	,,	3	,,	$4\frac{4}{5}$	,,
13	,,	=	$200\frac{1}{5}$	,,	……	,,	3	,,	$20\frac{1}{5}$	,,
14	,,	=	$215\frac{3}{5}$	,,	……	,,	3	,,	$35\frac{3}{5}$	,,
15	,,	=	231	,,	……	,,	3	,,	51	,,
16	,,	=	$246\frac{2}{5}$	,,	……	,,	4	,,	$6\frac{2}{5}$	,,
17	,,	=	$261\frac{4}{5}$	,,	……	,,	4	,,	$21\frac{4}{5}$	,,
18	,,	=	$277\frac{1}{5}$	,,	……	,,	4	,,	$37\frac{1}{5}$	,,
19	,,	=	$292\frac{3}{5}$	,,	……	,,	4	,,	$52\frac{3}{5}$	,,
20	,,	=	308	,,	……	,,	5	,,	8	,,
30	,,	=	462	,,	……	,,	7	,,	42	,,
40	,,	=	616	,,	……	,,	10	,,	16	,,
50	,,	=	770	,,	……	,,	12	,,	50	,,
60	,,	=	924	,,	……	,,	15	,,	24	,,
70	,,	=	1078	,,	……	,,	17	,,	58	,,
80	,,	=	1232	,,	……	,,	20	,,	32	,,
90	,,	=	1386	,,	……	,,	23	,,	6	,,
100	,,	=	1540	,,	……	,,	25	,,	40	,,

THERMOMETRIC TABLES,

SHOWING THE ASSIMILATION OF THE THERMOMETERS IN USE THROUGHOUT THE WORLD.

Celsius.	Réaumur.	Fahrenheit.	Celsius.	Réaumur.	Fahrenheit.
100	80·0	212·0	49	39·2	120·2
99	79·2	210·0	48	38·4	118·4
98	78·4	208·4	47	37·6	116·6
97	77·6	206·6	46	36·8	114·8
96	76·8	204·8	45	36·0	113·0
95	76·0	203·0	44	35·2	111·2
94	75·2	201·2	43	34·8	109·4
93	74·4	199·4	42	33·6	107·6
92	73·6	197·6	41	32·8	105·8
91	72·8	195·8	40	32·0	104·0
90	72·0	194·0	39	31·2	102·2
89	71·2	192·2	38	30·4	100·4
88	70·4	190·4	37	29·6	98·6
87	69·6	188·6	36	28·8	96·8
86	68·8	186·8	35	28·0	95·0
85	68·0	185·0	34	27·2	93·2
84	67·2	183·2	33	26·4	91·4
83	66·4	181·4	32	25·6	89·6
82	65·6	179·6	31	24·8	87·8
81	64·8	177·8	30	24·0	86·0
80	64·0	176·0	29	23·2	84·2
79	63·2	174·2	28	22·4	82·4
78	62·4	172·4	27	21·6	80·6
77	61·6	170·6	26	20·8	78·8
76	60·8	168·8	25	20·0	77·0
75	60·0	167·0	24	19·2	75·2
74	59·2	165·2	23	18·4	73·4
73	58·4	163·4	22	17·6	71·6
72	57·6	161·6	21	16·8	69·8
71	56·8	159·8	20	16·0	68·0
70	56·0	158·0	19	15·2	66·2
69	55·2	156·2	18	14·4	64·4
68	54·4	154·4	17	13·6	62·6
67	53·6	152·6	16	12·8	60·8
66	52·8	150·8	15	12·0	59·0
65	52·0	149·0	14	11·2	57·2
64	51·2	147·2	13	10·4	55·4
63	50·4	145·4	12	9·6	53·6
62	49·6	143·6	11	8·8	51·8
61	48·8	141·8	10	8·0	50·0
60	48·0	140·0	9	7·2	48·2
59	47·2	138·2	8	6·4	46·4
58	46·4	136·4	7	5·6	44·6
57	45·6	134·6	6	4·8	42·8
56	44·8	132·8	5	4·0	41·0
55	44·0	131·0	4	3·2	39·2
54	43·2	129·2	3	2·4	37·4
53	42·4	127·4	2	1·6	36·5
52	41·6	125·6	1	0·8	33.8
51	40·8	123·8	0	0·0	32·0
50	40·0	122·0			

Weights and Measures.

APOTHECARIES' WEIGHT.

SOLID MEASURE.

20 Grains = 1 Scruple = 20 Grains.
3 Scruples = 1 Drachm = 60 ,,
8 Drachms = 1 Ounce = 480 ,,
12 Ounces = 1 Pound = 5760 ,,

FLUID. Symbol.

60 Minims = 1 Fluid Drachm f. ʒ
8 Drachms = 1 Ounce f.
20 Ounces = 1 Pint O ℥
8 Pints = 1 Gallon gall.

The above weights are those usually adopted in formulæ.

All Chemicals are usually sold by

AVOIRDUPOIS WEIGHT.

27$\frac{11}{32}$ Grains = 1 Drachm = 27$\frac{11}{32}$ Grains,
16 Drams = 1 Ounce = 437½ ,,
16 Ounces = 1 Pound = 7000 ,,

Precious Metals are usually sold by

TROY WEIGHT.

24 Grains = 1 Pennyweight = 24 Grains,
20 Pennyweights = 1 Ounce = 480 ,,
12 Ounces = 1 Pound = 5760 ,,

NOTE.—An ounce of *metallic* silver contains 480 grains, but an ounce of *nitrate* of silver contains only 437½ grains.

FRENCH WEIGHTS AND MEASURES,

AND THEIR EQUIVALENTS IN ENGLISH.

1 Cubic Centimètre = 17 minims nearly.
3½ ,, ,, = 1 drachm.
28·4 ,, ,, = 1 ounce.
50 ,, ,, = 1 ounce 6 drachms 5 minims.
100 ,, ,, = 3 ounces 4 drachms 9 minims.
1000 ,, ,,
or 1 litre,
= to 61 cubic inches } = 35 ounces 1 drachm 36 minims.

The unit of French liquid measures is a cubic *centimètre*.

A cubic *centimètre* of water measures nearly 17 minims (16·896); it weighs 15·4 grains, or 1 *gramme*. A cubic *inch* of water weighs 252·5 grains.

The unit of French weights is the gramme = to 15·4 grains; thus a drachm (60 grains) is nearly 4 grammes (3·88). An easy way to convert grammes into English weight is to divide the sum by 4, which gives the equivalent in drachms very nearly thus:—

Grammes. Drachms. Oz. Drachm. Grains.
100 ÷ 4 = 25 = 3 . 1 + 43

TABLES FOR THE SIMPLIFICATION OF EMULSION CALCULATIONS.

With a view of simplifying the calculations involved in emulsion making, Mr. William Ackland has worked out some useful tables which will enable even those most ignorant of chemical philosophy to calculate with ease and rapidity the proper quantities of silver or haloid salts in any formula. Even those who are able to perform the calculations in the recognised style will find their labours materially lightened by means of these tables, which should be kept in a convenient place for reference in every laboratory.

No. I.

	Equivalent weights.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$	Weight of *silver* haloid produced by one grain of *soluble* haloid.	Weight of *soluble* haloid required to produce one grain of *silver* haloid.	Weight of silver haloid produced from one grain $AgNO_3$
Ammonium bromide ..	98	1·734	·576	1·918	·521	
Potassium ,, ..	119·1	1·427	·700	1·578	·633	1·106
Sodium ,, ..	103	1·650	·606	1·825	·548	
Cadmium ,, com.	172	·988	1·012	1·093	·915	
,, ,, anh.	136	1·25	·800	1·382	·723	
Zinc ,, ..	112·1	1·509	·663	1·670	·600	
Ammonium chloride ..	53·5	3·177	·315	2·682	·373	·844
Sodium ,, ..	58·5	2·906	·344	2.453	·408	
Ammonium iodide ..	145	1·172	·853	1·620	·617	1·382
Potassium ,, ..	166·1	1·023	·977	1·415	·707	
Sodium ,, ..	150	1·133	·882	1·566	·638	
Cadmium ,, ..	183	·929	1·076	1·284	·778	

The principal bromides, chlorides, and iodides which are likely to be used in emulsions of either gelatine or collodion have been included in these tables. Table No I. presents to the reader, without any mystification which may be involved in equivalents, the actual weights of haloid or silver, as the case may be, required to convert or combine with one grain of the other.

In order to test the utility of this table, let us suppose that it is desired to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows:—

Bromide of potassium	150 grains.
Iodide of potassium	10 ,,
Chloride of ammonium..............................	10 ,,
Gelatine	200 ,,

Now we want to know how much silver nitrate should be employed in sensitising this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum:—

Potassium bromide ...... 150 × 1·427 = 214
,, iodide .... 10 × 1·023 = 10·23
Chloride of ammonium .. 10 × 3·177 = 31·77
} Weight silver nitrate required,

or the total quantity of silver nitrate required for full conversion .... } 256·00 grains.

No. II.

	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide. (Coml.)	Cadmium Bromide. (Anhyd.)	Zinc Bromide.	Ammonium Chloride.	Sodium Chloride.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.
Ammonium bromide......	1	·823	·951	·57	·72	·87	1·832	1·675	·676	·59	·653	·535
Potassium ,, ...	1·215	1	1·156	·692	·876	1·058	2·226	2·036	·821	·717	·794	·651
Sodium ,, ...	1·051	·865	1	·599	·757	·915	1·925	1·761	·71	·62	·686	·563
Cadmium ,, com	1·755	1·444	1·67	1	1·265	1·527	3·215	2·94	1·186	1·035	1·146	·94
,, ,, anh.	1·387	1·141	1·32	·79	1	1·207	2·542	2·324	·938	·819	·906	·743
Zinc ,, ...	1·149	·945	1·093	·655	·828	1	2·104	1·925	·776	·678	·75	·615
Ammonium chloride......	·546	·449	·519	·311	·393	·475	1	·914	·369	·322	·356	·292
dium ,, ...	·597	·491	·568	·34	·43	·519	1·093	1	·403	·352	·39	·319
Ammonium iodide	1·479	1·217	1·408	·843	1·066	1·287	2·712	2·478	1	·873	·966	·792
Potassium ,, ...	1·695	1·394	1·612	·965	1·221	1·475	3·104	2·839	1·145	1	1·107	907
Sodium ,, ...	1·53	1·259	1·456	·872	1·103	1·332	2·803	2·564	1·034	·903	1	·819
Cadmium ,, ...	1·867	1·536	1·776	1·064	1·345	1·625	3·42	3·128	1·262	1·102	1·22	1

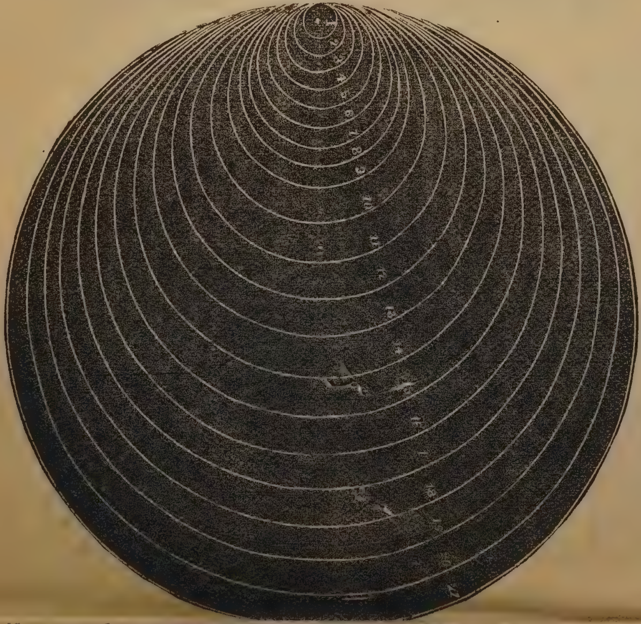
TABLE No. II. gives in separate columns the relative converting values of each of the soluble haloid salts in ordinary use, showing how much of any salt must be used to replace one grain of any other. In each column will be found a unit (printed in larger type) which represents one grain of the salt named at the head of the column; the other figures in the same column show the exact quantities of the other salts which must be used in lieu of a single grain of that particular haloid. Thus, taking the first column, which is headed "Ammonium Bromide," we find against ammonium bromide in the margin the figure 1, representing one grain of that salt. If we wish to know the relative converting power of potassium bromide we take the number in the same column which stands against the latter salt in the margin, viz., 1·215; that is to say, 1·215 grain of potassium bromide will be required to do the same work as one

MR. W. K. BURTON'S TABLE OF COMPARATIVE EXPOSURES.

Apertures Calculated on the standard system of the Photographic Society.	Sea and Sky.	Open Landscape.	Landscape with heavy foliage in foreground.	Under Trees, up to		Fairly-lighted Interiors.		Badly-lighted Interiors, up to		Portraits in bright diffused Light out of doors	Portraits in good studio Light.		Portraits in Ordinary Room.	
				mins.	secs.	mins.	secs.	hours.	mins.		mins.	secs.	mins.	secs.
No. 1, or $\frac{f}{4}$	$\frac{1}{160}$ sec.	$\frac{1}{50}$ sec.	$\frac{1}{8}$ sec.	0	10	0	10	0	2	$\frac{1}{6}$ sec.	0	1	0	4
No. 2, or $\frac{f}{5 \cdot 657}$	$\frac{1}{80}$ sec.	$\frac{1}{25}$ sec.	$\frac{1}{4}$ sec.	0	20	0	20	0	4	$\frac{1}{3}$ sec.	0	2	0	8
No. 4, or $\frac{f}{8}$	$\frac{1}{40}$ sec.	$\frac{1}{12}$ sec.	$\frac{1}{2}$ sec.	0	40	0	40	0	8	$\frac{2}{3}$ sec.	0	4	0	16
No. 8, or $\frac{f}{11 \cdot 314}$	$\frac{1}{20}$ sec.	$\frac{1}{6}$ sec.	1 sec.	1	20	1	20	0	16	$1\frac{1}{3}$ sec.	0	8	0	32
No. 16, or $\frac{f}{16}$	$\frac{1}{10}$ sec.	$\frac{1}{3}$ sec.	2 secs.	2	40	2	40	0	32	$2\frac{2}{3}$ secs.	0	16	1	4
No. 32, or $\frac{f}{22 \cdot 627}$	$\frac{1}{5}$ sec.	$\frac{2}{3}$ sec.	4 secs.	5	20	5	20	1	4	$5\frac{1}{3}$ secs.	0	32	2	8
No. 64, or $\frac{f}{32}$	$\frac{2}{5}$ sec.	$1\frac{1}{3}$ sec.	8 secs.	10	40	10	40	2	8	$10\frac{1}{2}$ secs.	1	4	4	15
No. 128, or $\frac{f}{45 \cdot 255}$	$\frac{4}{5}$ sec.	$2\frac{2}{3}$ secs.	16 secs.	21	0	21	0	4	15	21 secs.	2	8	8	30
No. 256, or $\frac{f}{64}$	$1\frac{1}{2}$ sec.	$5\frac{1}{2}$ secs.	32 secs.	42	0	42	0	8	30	42 secs.	4	15	17	0

THE PHOTOGRAPHIC SOCIETY'S STANDARD DIAPHRAGMS.

THE annexed diagram and table are intended to facilitate the calculation of the proper number with which to mark the diaphragms according to the Photographic Society of Great Britain's Uniform System which will be found described on another page. This number it is proposed to call the "U. S." (or unifom system number). The numbered circles in the diagram represent the sizes of stops. The photographer, knowing the equivalent focus of his lens, looks along the line opposite the number which represents the circle nearest inside to his diaphragm, and when he gets to the column headed by that equivalent focus the number there found is the U. S. number to be marked on the diaphragm. For example: a lens of eight inches equivalent focus has a diaphragm in size about No. 5 on the diaphragm; running the eye along the line opposite No. 5 we find in the column under—"focus eight inches" the No. 11, which is the U. S. number required.



No. of Circle.	4 focus	5 focus	6 focus	7 focus	8 focus	9 focus	10 focus	12 focus	14 focus
1	25	39	56						
2	11	17	25	34	44	56	68		
3	6¼	10	14	19	25	31	40	56	
4	4	6¼	9	12	16	20	25	36	48
5	2¾	4¼	6¼	8½	11	14	17	25	34
6	2	3⅕	4½	6¼	8	10	13	18	25
7	1½	2½	3½	4¾	6	8	10	14	19
8	1¼	2	2¾	3¾	5	6¼	8	11	15
9	1	1½	2¼	3	4	5	6¼	9	12¼
10		1	1½	2⅛	2¾	3½	4⅓	6	8½
11			1¼	1½	2	2½	3⅕	5	6¼
12			⅞	1⅕	1½	2	2½	3½	4¾
13				1	1¼	1⅚	1⅔	2¾	4
14					1	1¼	1½	2¼	3
15						1	1⅓	1⅞	2½
16							1	1½	2
17								1⅓	7⅔
18								1⅙	1½
19								1	1⅓
20									1⅕
21									1

TABLE FOR ENLARGEMENTS.

Focus of Lens, inches.	TIMES OF ENLARGEMENT AND REDUCTION.							
	1 inches.	2 inches.	3 inches.	4 inches.	5 inches.	6 inches.	7 inches.	8 inches.
2	4 4	6 3	8 $2\frac{3}{4}$	10 $2\frac{1}{2}$	12 $2\frac{2}{5}$	14 $2\frac{1}{3}$	16 $2\frac{2}{7}$	18 $2\frac{1}{4}$
$2\frac{1}{2}$	5 5	$7\frac{1}{2}$ $3\frac{3}{4}$	10 $3\frac{1}{3}$	$12\frac{1}{2}$ $3\frac{1}{8}$	15 3	$17\frac{1}{2}$ $2\frac{11}{12}$	20 $2\frac{6}{7}$	$22\frac{1}{2}$ $2\frac{13}{16}$
3	6 6	9 $4\frac{1}{2}$	12 4	15 $3\frac{3}{4}$	18 $3\frac{3}{5}$	21 $3\frac{1}{2}$	24 $3\frac{3}{7}$	27 $3\frac{3}{8}$
$3\frac{1}{2}$	7 7	$10\frac{1}{2}$ $5\frac{1}{4}$	14 $4\frac{2}{3}$	$17\frac{1}{2}$ $4\frac{3}{4}$	21 $4\frac{1}{5}$	$24\frac{1}{2}$ $4\frac{1}{12}$	28 4	$31\frac{1}{2}$ $3\frac{15}{16}$
4	8 8	12 6	16 $5\frac{1}{4}$	20 5	24 $4\frac{4}{5}$	28 $4\frac{2}{3}$	32 $4\frac{4}{7}$	36 $4\frac{1}{2}$
$4\frac{1}{2}$	9 9	$13\frac{1}{2}$ $6\frac{3}{4}$	18 6	$22\frac{1}{2}$ $5\frac{5}{8}$	27 $5\frac{2}{5}$	$31\frac{1}{2}$ $5\frac{1}{4}$	36 $5\frac{1}{7}$	$40\frac{1}{2}$ $5\frac{1}{16}$
5	10 10	15 $7\frac{1}{2}$	20 $6\frac{2}{3}$	25 $6\frac{1}{4}$	30 6	35 $5\frac{5}{6}$	40 $5\frac{5}{7}$	45 $5\frac{5}{8}$
$5\frac{1}{2}$	11 11	$16\frac{1}{2}$ $8\frac{1}{4}$	22 $7\frac{1}{8}$	$27\frac{1}{2}$ $6\frac{7}{8}$	33 $6\frac{1}{2}$	$38\frac{1}{2}$ $6\frac{5}{12}$	44 $6\frac{2}{7}$	$49\frac{1}{2}$ $6\frac{3}{16}$
6	12 12	18 9	24 8	30 $7\frac{1}{2}$	36 $7\frac{1}{6}$	42 7	48 $6\frac{6}{7}$	54 $6\frac{3}{4}$
7	14 14	21 $10\frac{1}{2}$	28 $9\frac{1}{3}$	35 $8\frac{3}{4}$	42 $8\frac{2}{5}$	49 $8\frac{1}{6}$	56 8	63 $7\frac{7}{8}$
8	16 16	24 12	32 $10\frac{2}{3}$	40 10	48 $9\frac{3}{5}$	56 $9\frac{1}{3}$	64 $9\frac{1}{7}$	72 9
9	18 18	27 $13\frac{1}{2}$	36 12	45 $11\frac{1}{4}$	54 $10\frac{4}{5}$	63 $10\frac{1}{2}$	72 $10\frac{2}{7}$	81 $10\frac{1}{8}$

THE object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times, to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical centre. The use of the table will be seen from the following illustration:—A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focus. He must, therefore, look for 4 on the upper horizontal line, and for 6 in the first vertical column, and carry his eye to where these two join, which will be at 30—7½. The greater of these is the distance the sensitive plate must be from the centre of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied; the latter, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be twelve inches, as this number is not in the column of focal lengths, look out for 6 in this column and multiply by 2; and so on with any other numbers.

"UNIFORM SYSTEM" NUMBERS FOR STOPS FROM $\frac{f}{1}$ TO $\frac{f}{100}$.

In the following table Mr. S. A. Warburton has calculated the exposure necessary with every stop from $\frac{f}{1}$ to $\frac{f}{100}$ compared with the unit stop of the "uniform system" of the Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from $\frac{f}{4}$, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.	f	U. S. No.	f	U. S. No.
1	$\frac{1}{16}$	15	14·06	58	210·25
1¼	·097	16	16	59	217·56
1·414	$\frac{1}{8}$	17	18·06	60	225·00
1½	·140	18	20·25	61	232·56
1¾	·191	19	22·56	62	240·25
2	$\frac{1}{4}$	20	25·00	63	248·06
2¼	·316	21	27·56	64	256
2½	·390	22	30·25	65	264·06
2·828	$\frac{1}{2}$	22·62	32	66	272·25
2¾	·472	23	33·06	67	280·56
3	·562	24	36·00	68	289·00
3¼	·660	25	39·06	69	297·56
3½	·765	26	42·25	70	306·25
3¾	·878	27	45·56	71	315·06
4	1·00	28	49·00	72	324·00
4½	1·12	29	52·56	73	333·06
4½	1·26	30	56·25	74	342·25
4¾	1·41	31	60·06	75	351·56
5	1·56	32	64	76	361·00
5¼	1·72	33	68·06	77	370·56
5½	1·89	34	72·25	78	380·25
5·656	2	35	76·56	79	390·06
5¾	2·06	36	81·00	80	400·00
6	2·25	37	85·56	81	410·06
6¼	2·44	38	90·25	82	420·25
6½	2·64	39	95·06	83	430·56
6¾	2·84	40	100·00	84	440·00
7	3·06	41	105·06	85	451·56
7¼	3·28	42	110·25	86	462·25
7½	3·51	43	115·56	87	473·06
7¾	3·75	44	121·00	88	484·00
8	4	45	126·56	89	495·06
8¼	4·25	45·25	128	90	506·25
8½	4·51	46	132·25	90·50	512
8¾	4·78	47	138·06	91	517·56
9	5·06	48	144·00	92	529·00
9¼	5·34	49	150·06	93	540·56
9½	5·64	50	156·25	94	552·25
9¾	5·94	51	162·56	95	564·06
10	6·25	52	169·00	96	576·00
11	7·56	53	175·56	97	588·06
11·31	8	54	182·25	98	600·25
12	9·00	55	189·06	99	612·56
13	10·56	56	196·00	100	625·00
14	12·25	57	203·06		

EQUATIONS RELATING TO FOCI, &c.

The following simple optical formulæ and calculations, worked out by Mr. J. A. C. Branfill, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes :—

p = Principal focus.
F = Greater conjugate focus.
f = Lesser do. do.
r = Ratio of any dimension in original to the same dimension in copy (in case of reduction), or *vice versâ* (in case of enlargement).
a = Diameter of aperture to lens.
x = Exposure required, assuming that $x = 1$ when $a = \frac{p}{4}$

$$p = \frac{r\,(F + f)}{(r + 1)^2}$$

$$f = p\left(\frac{1 + r}{r}\right) = \frac{F + f}{r + 1}$$

$$F = p\,(r + 1) = rf$$

$$F + f = p \times \frac{(r + 1)^2}{r} = p\left(2 + r + \frac{1}{r}\right)$$

$$r = \frac{F - p}{p} = \frac{p}{f - p} = \frac{F}{f}$$

$$x = \frac{f^2}{16\,a^2}$$

N.B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16\,a^2}$

Note.—In case the above may not be clear to some photographers, the following rules may be better understood :—

To find the principal focus of a lens *(p)*, focus a near object in the camera, and measure the distance between it and the ground glass *(F + f)* ; next find the proportion which any dimension in the object bears to the same dimension on the ground glass *(r)*. Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply $F + f$ by r, and divide the product by the square of a number greater by one than r, $(r + 1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus *(f)* (if p and r are known) multiply p by the sum of $r + 1$ and divide the product by r. Or divide $F + f$ by $r + 1$.

To find the greater conjugate focus *(F)* multiply p by $r + 1$. Or multiply f by r.

To find $F + f$ (the distance which the ground glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r + \frac{1}{r} + 2$.

To find r divide $F - p$ (the difference between F and p) by p. Or divide p by $f - p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture [to lens).

For example : focus an object which is five inches high, so that it is one inch high on the ground glass ; thus we know that $r = 5$. Next measure the distance between the object and the ground glass *(F + f)*, which is found to be 45 inches.

Then $p = 45 \times$ (multiplied by) $5 \div$ (divided by) $6 \times 6 = 6\frac{1}{4}$ inches.
$f = 6\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$F + f = 6\frac{1}{4} \times (5 + \frac{1}{5} + 2) = 6\frac{1}{4} \times 7\frac{1}{5} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5$. Or $r = 6\frac{1}{4} \div (7\frac{1}{2} - 6\frac{1}{4}) = 5$.

And x (the exposure required) will be $7\frac{1}{2} \times 7\frac{1}{2} \div (16 \times \frac{9}{16}) = 6\frac{1}{4}$; that is, the exposure will be $6\frac{1}{4}$ times as much as the exposure required with an aperture whose diameter equals $p \div 4$, assuming the aperture (a) to be $\frac{3}{4}$ inch diameter.

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Philadelphia Photographer.—Edited and published by E. L. Wilson, Philadelphia, U.S.

The St. Louis Photographer.—Edited by J. M. Tomlinson. Published by Mrs. J. H. Fitzgibbon, St. Louis.

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Journal de l'Industrie Photographique.—Organ of la Chambre Syndicale de la Photographie Published by M. Gauthier-Villars, Paris.

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Bulletin Belge de la Photographie.—Edited by M. Leon Deltenre. Published by M. J. Petit, Brussels.

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Photographisches Wochenblatt.—Edited by Dr. Franz Stolze, Düsseldorf. Published at Berlin. Organ of the Berlin Photographic Society,

Photographisches Archiv.—Edited by Dr. Paul E. Liesegang, Berlin. Published by Theobald Frieben, Düsseldorf.

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Photographischer Beobachter.—Edited by Julius Pfeiffer. Published by Carl Groll, Guben.

Zeitschrift für Practische Photographie und Verwandte Fächer.—Edited by J. A. Finsterlin. Published at Munich. Organ of the Photographic Society of Munich.

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APPLICATION FOR PATENTS CONNECTED WITH THE PHOTOGRAPHIC ART.

G. E. Lardeur: Production of Transfer Designs. No. 5,827, dated December 21, 1883.—A. Borland: Improvements in Apparatus for the Production of Photographic Negatives to be Used in Photolithography, Photozincography, Photo-engraving, Photo-etching, or Phototype Productions. No. 5,896, dated December 28, 1883.—G. Rydill: Preparation of Photographs and the Treatment of Drawings or Designs Printed upon Paper or other suitable material for the Purpose of Imitating Stained, Ground, Cut, or Embossed Glass, or to be Employed for other Useful or Ornamental Purposes. No. 5,947, dated December 31, 1883.—F. W. Hart: Photographic Cameras, known as Portable, Folding, or Tourists' Cameras. No. 8, dated January 1, 1884.—H. Vander Weyde: Producing Vignetted Photographs. No. 194, dated January 1.—W. Morgan: Production of Pictures and other like Mounts. No. 175, dated January 1.—J. W. Ayres: Construction of Speculum. No. 229, dated January 1.—S. D. McKellen: Photographic Cameras. No. 319, dated January 2.—G. D. Macdougald: Apparatus for Storing, Conveying, and Applying Developing and other Chemicals required or suitable for the Prodnction of Photographic Pictures. No. 416, dated January 2 (complete).—F. Hazeldine: Apparatus for Use in Washing Photographic Prints and other Articles or Materials. No. 712, dated January 4 (complete).—M. Gill: Use or Application of the Camera Principle in Surveying, Sighting, &c. No. 741, dated January 5.—S. D. McKellen: Photographic Exposing Apparatus. No. 1,042, dated January 9.—T. Sebastian Davis: Construction of Apparatus for Photographing without the Aid of Daylight. No. 1,113, dated January 10.—L. Warnerke: Shutters for Photographic Purposes. No. 1,206, dated January 11.—G. Rydill: Treating and Producing Coloured Photographic Transparencies for Decoration and Production of Various Designs on Sheet or Plate Glass, Talc, Bladder, Parchment, or Paper, so as to Represent Stained, Cut, Embossed, or Enamelled Glass in one or any number of Colours or Designs. No. 1,251, dated January 11.—A. F. Link: Means and Apparatus for Applying the Electric Light to Cameras and to other Analogous Purposes. No. 2,211, dated January 26.—A. G. Brooks; a communication from E. Kunkler and J. Brunner: Prepa.ation of Surfaces for Printing or Etching by the Aid of Photography. No. 2,312, dated January 29.—F. W. Branson: Photographic Shutters. Nos. 2,766 and 2,767, dated February 5.—W. B. Woodbury: Methods of Producing Printing Blocks by Means of Photography. No. 2,981, dated February 8.—A. M. F. Caspar: The Easy Copying and Toning of Photographs and other Prints. No. 2,987, dated February 8.—J. and A. G. Hopkins: Apparatus for Exposing Sensitive Platas in Cameras. 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January 1st, 1885.

THE

YEAR-BOOK OF PHOTOGRAPHY,

AND

PHOTOGRAPHIC NEWS ALMANAC

FOR

1885,

EDITED BY THOMAS BOLAS, F.C.S.

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A COMPLETE CALENDAR FOR THE YEAR.

TOGETHER WITH

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ECLIPSES IN 1885.

During the year 1885 there will be two Eclipses of the Sun, and two of the Moon, viz.:—

March 16.—Annular Eclipse of the Sun, invisible at Greenwich.
March 30.—Partial Eclipse of the Moon, partly visible at Greenwich.
September 8.—Total Eclipse of the Sun, invisible at Greenwich.
September 24.—Partial Eclipse of the Moon, partly visible at Greenwich.

LAW SITTINGS.

Hilary	Begins	January	12	Ends	April	1
Easter	,,	April	14	,,	May	22
Trinity	,,	June	2	,,	August	12
Michaelmas	,,	October	24	,,	December	21

CHRONOLOGICAL NOTES.

Golden Number	5	Roman Indiction	13
Epact	14	Dominical Letter	D
Solar Cycle	18	Julian Period	6598

FESTIVALS, ETC.

Epiphany	Jan.	6
Septuagesima Sunday ...	Feb.	1
Quinquagesima—Shrove Sunday	,,	15
Ash Wednesday	,,	18
Quadragesima — 1st Sunday in Lent	,,	22
St. David	Mar.	1
St. Patrick	,,	17
Annunciation—Lady Day...	,,	25
Palm Sunday	,,	29
Good Friday	April	1
Easter Sunday	,,	5
Low Sunday	,,	12
St. George	,,	23
Rogation Sunday	May	10
Ascension Day — Holy Thursday	May	14
Birth of Queen Victoria ...	,,	24
Pentecost—Whit Sunday...	,,	24
Trinity Sunday	,,	31
Corpus Christi	June	4
Accession of Queen Victoria	,,	20
Proclamation	,,	21
St. John Baptist — Midsummer Day	,,	24
St. Michael—Michlms. Day	Sept.	29
Birth of Prince of Wales ...	Nov.	9
1st Sunday in Advent ...	,,	29
St. Andrew	,,	30
St. Thomas	Dec.	21
Christmas Day	,,	25

THE SEASONS.

Spring Quarter begins	March 20	Autumn Quarter begins	Sept. 22
Summer ,, ,,	June 21	Winter ,, ,,	Dec. 21

JANUARY—31 DAYS.

D M	D W	MEMORANDA.	Sun.				Moon.				High Water.			
			Rises.		Sets.		Rises.		Sets.		Morn.		After.	
			H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
1	Th	S. Lond., Bolton, Dundee,	8	8	4	0	5	2	7	42	1	20	1	48
2	F	[Leeds, & Lon. & Prov.	8	8	4	1	6	17	8	30	2	13	2	39
3	S	1st Port. Studio in Amer.	8	8	4	2	7	34	9	11	3	4	3	28
4	𝔖	2nd Sun aft. Christ. ['39	8	8	4	3	8	50	9	45	3	52	4	17
5	M	Yorkshire Photo. Society	8	8	4	4	10	4	10	14	4	40	5	3
6	Tu	Sheffield & Glossop Socs.	8	7	4	6	11	14	10	41	5	27	5	48
7	W	Edin., Ben., & Staff. Socs.	8	7	4	7	Morn		11	6	6	9	6	34
8	Th	Manch. & Lond. & Prov.	8	6	4	8	0	22	11	31	6	58	7	22
9	F	Soc. Ireland. Fire Insur.	8	6	4	10	1	28	11	57	7	48	8	15
10	S	[expires	8	5	4	11	2	31	After		8	48	9	24
11	𝔖	1st Sunday af. Epiphany.	8	5	4	12	3	32	0	59	10	0	10	38
12	M	[of Scot. Socs.	8	4	4	14	4	29	1	36	11	13	11	46
13	Tu	Gt. Brit., Newcastle, & W.	8	3	4	15	5	23	2	18	—		0	15
14	W	Chelten. (An.Mtg.) &Bury	8	2	4	17	6	12	3	6	0	41	1	3
15	Th	Lon. & Prov. Socs. G.W.	8	2	4	18	6	55	4	0	1	26	1	46
16	F	[Simpson d. 1880	8	1	4	20	7	33	4	58	2	4	2	21
17	S	C. Blane (art critic) d. '82	8	0	4	22	8	6	6	0	2	38	2	54
18	𝔖	2nd Sunday aft. Epiphany	7	59	4	23	8	36	7	4	3	10	3	27
19	M	James Watt b. 1736	7	58	4	25	9	3	8	11	3	43	4	1
20	Tu	Lond. Photo. Soc. estab.	7	57	4	27	9	28	9	18	4	18	4	36
21	W	[1853	7	56	4	28	9	52	10	26	4	52	5	10
22	Th	London & Prov. Soc.	7	54	4	30	10	18	11	37	5	26	5	46
23	F	G. Doré (artist) d. 1883	7	53	4	32	10	47	Morn		6	7	6	30
24	S	[J. M. Burgess d. 1873	7	52	4	33	11	18	0	48	6	54	7	21
25	𝔖	3rd Sunday aft. Epiph.	7	51	4	35	11	54	2	0	7	49	8	21
26	M	[Poitevin's Gel.Br. Pro.'50	7	49	4	37	After.		3	12	8	57	9	37
27	Tu	Soc. Gt. Brit. Tech. Mtg.	7	48	4	39	1	32	4	21	10	19	10	58
28	W	Bristol Society [Prov.	7	47	4	40	2	35	5	23	11	38	—	
29	Th	L'pool, Oldham, & Lon. &	7	45	4	42	3	46	6	16	0	12	0	44
30	F	J. R. Johnson d. 1881	7	44	4	44	5	3	7	2	1	12	1	39
31	S	Daguerre pub. details '39	7	42	4	46	6	21	7	40	2	5	2	29

MOON'S PHASES.

Full Moon,	1st day, 5h. 26m. M.	*New Moon,*	16th day, 8h. 37m. M.
Last Quarter,	8th day, 3h. 37m. M.	*First Quarter,*	24th day, 1h. 26m. M.

Full Moon, 30th, 4h. 19m. A.

MORNING AND EVENING STARS.

Mercury, *Morning Star*; conjunction with Sun, 3rd; with Moon and stationary, 4th; with Venus, 24th; greatest W. elongation, 26th.

Venus, *Morning Star* throughout month; conjunction with Moon, 13th.

Mars, *Evening Star* throughout month; conjunction with Moon, 17th.

Jupiter, *Evening Star* throughout month.

FEBRUARY—28 DAYS.

D M	D W	MEMORANDA.	SUN.		MOON.		HIGH WATER.	
			RISES.	SETS.	RISES.	SETS.	MORN.	AFTER.
			H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	S	Septuagesima Sunday	7 40	4 48	7 38	8 12	2 52	3 15
2	M	Yorkshire Photo. Society	7 39	4 50	8 52	8 41	3 38	3 59
3	Tu	Sheffield & Glossop Socs.	7 38	4 51	10 3	9 8	4 21	4 43
4	W	Edin., Ben., & Staff. Socs.	7 36	4 53	11 12	9 33	5 2	5 22
5	Th	S. Lond., Bolton, Dundee,	7 34	4 55	Morn	10 0	5 40	6 0
6	F	[Leeds, & Lon. & Prov.	7 33	4 57	0 18	10 29	6 20	6 40
7	S	Poitevin des. Photo-Eng.	7 31	4 59	1 20	11 0	7 2	7 26
8	S	Sexagesima Sunday ['48	7 29	5 1	2 20	11 35	7 52	8 22
9	M	[of Scot. Socs.	7 27	5 2	3 15	After	8 57	9 37
10	Tu	Gt. Brit., Newcastle, & W.	7 26	5 4	4 6	1 2	10 20	10 59
11	W	Bury Photo. Society	7 24	5 6	4 51	1 53	11 36	—
12	Th	Manch. & Lon. & Prov.	7 22	5 8	5 31	2 50	0 9	0 37
13	F	Society of Ireland	7 20	5 10	6 7	3 51	1 2	1 21
14	S	Valentine's Day	7 18	5 12	6 39	4 54	1 42	2 2
15	S	Quinquagesima Sunday	7 16	5 13	7 7	6 0	2 18	2 36
16	M	Glasgow Soc. estab. 1860	7 14	5 15	7 33	7 8	2 51	3 6
17	Tu	Shrove Tuesday	7 12	5 17	7 59	8 17	3 22	3 40
18	W	Lon. & Prov. Ash Wed.	7 10	5 19	8 24	9 27	3 56	4 15
19	Th	Copernicus born 1473	7 8	5 21	8 52	10 39	4 32	4 50
20	F	Prs. Louise of Wales b. '67	7 6	5 22	9 22	11 50	5 7	5 25
21	S	P. Le Neve Foster d. '79	7 4	5 24	9 56	Morn	5 44	6 7
22	S	1st Sunday in Lent	7 2	5 26	10 37	1 1	6 29	6 54
23	M	Sir J. Reynolds died 1792	7 0	5 28	11 25	2 9	7 23	7 55
24	Tu	Soc. Gt. Brit. Tech. Mtg.	6 58	5 30	After	3 11	8 31	9 12
25	W	Bristol Society [Prov.	6 56	5 31	1 28	4 7	9 59	10 44
26	Th	L'pool, Oldham, & Lon. &	6 54	5 33	2 40	4 54	11 26	—
27	F	Hare hunting ends	6 52	5 35	3 55	5 34	0 3	0 35
28	S	Swan's Carbon Pat. 1864	6 50	5 37	5 10	6 8	1 3	1 29

MOON'S PHASES.

Last Quarter, 6th day, 10h. 38m. A. | *New Moon,* 15th day, 2h. 22m. M.
First Quarter, 22nd day, 10h. 31m. M.

MORNING AND EVENING STARS.

Mercury, *Morning Star* throughout month; conjunction with Venus, and in aphelion, 12th; conjunction with Moon, 13th.

Mars, in conjunction with Sun, 11th; with Moon, 15th; in perihelion, 28th.

Venus, *Morning Star* throughout month; conjunction with Moon, 13th.

Jupiter, *Evening Star* throughout month; conjunction with Moon, 1st and 28th; opposition to Sun, 19th.

Saturn, *Evening Star* throughout month; stationary, 17th; conjunction with Moon, 23rd.

MARCH—31 DAYS.

D M	D W	MEMORANDA.	SUN.		MOON.		HIGH WATER.	
			RISES.	SETS.	RISES.	SETS.	MORN.	AFTER.
			H. M.	H. M.	H. M	H M.	H. M.	H. M.
1	𝕾	2nd SUNDAY IN LENT	6 48	5 39	6 26	6 39	1 54	2 16
2	M	Yorkshire Photo. Society	6 45	5 40	7 39	7 6	2 37	2 57
3	Tu	Sheffield & Glossop Socs.	6 43	5 42	8 51	7 33	3 18	3 37
4	W	Edin., Ben., & Staff. Socs.	6 41	5 44	10 0	8 1	3 56	4 16
5	Th	S. Lond., Bolton, Dundee,	6 39	5 46	11 5	8 29	4 34	4 52
6	F	[Leeds, & Lon. & Prov.	6 36	5 47	Morn	8 59	5 9	5 26
7	S	J. N. Niépce b. 1765	6 34	5 49	0 7	9 33	5 43	6 2
8	𝕾	3rd SUNDAY in LENT	6 32	5 51	1 5	10 12	6 23	6 44
9	M	[& W. of Scot. Socs.	6 30	5 53	1 58	10 56	7 8	7 34
10	Tu	Great Britain. Newcastle,	6 28	5 54	2 45	11 45	8 6	8 40
11	W	Bury Photo. Society	6 25	5 56	3 28	After	9 22	10 8
12	Th	Manch. & Lond. & Prov.	6 23	5 58	4 5	1 37	10 50	11 26
13	F	Society of Ireland [d.'79	6 21	5 59	4 38	2 40	11 58	—
14	S	Woodworth (photomicro.)	6 19	6 1	5 7	3 45	0 28	0 52
15	𝕾	4th SUNDAY IN LENT.	6 16	6 3	5 35	4 53	1 12	1 31
16	M	Glasgow Soc. estab. 1860	6 14	6 4	6 1	6 3	1 50	2 8
17	Tu	[Chlor. Process pub.	6 12	6 6	6 27	7 14	2 24	2 39
18	W	Wharton Simpson's Col.-	6 9	6 8	6 55	8 26	2 56	3 15
19	Th	London & Prov. Society	6 7	6 10	7 24	9 39	3 32	3 49
20	F	Sir J. Newton d. 1727	6 5	6 11	7 58	10 52	4 9	4 27
21	S	Bingham d. 1870	6 3	6 13	8 37	Morn	4 46	5 6
22	𝕾	5th SUNDAY IN LENT	6 0	6 15	9 23	0 1	5 27	5 48
23	M	Woodbury's Photo-relief	5 58	6 16	10 17	1 5	6 13	6 40
24	Tu	[Proc. pat. 1865	5 56	6 18	11 18	2 2	7 11	7 43
25	W	Bristol Soc. *Lady Day*	5 53	6 20	After	2 51	8 20	9 2
26	Th	L'pool, Oldham & Lond. &	5 51	6 21	1 39	3 32	9 50	10 33
27	F	Amiens Treaty '02 [Prov.	5 49	6 23	2 52	4 7	11 14	11 50
28	S	La Place b. 1749	5 47	6 25	4 5	4 38	—	0 23
29	𝕾	PALM SUNDAY	5 44	6 26	5 19	5 6	0 48	1 12
30	M	Balard d. 1876	5 42	6 28	6 30	5 33	1 35	1 58
31	Tu	Bunsen b. 1811	5 40	6 30	7 40	6 0	2 16	2 35

MOON'S PHASES.

Full Moon,	1st day, 4h. 0m. M.	*New Moon,*	16th day, 5h. 37m. A.
Last Quarter,	8th day, 6h. 54m. A.	*First Quarter,*	23rd day, 5h. 23m. M.

Full Moon, 30th day, 4h. 40m. A.

MORNING AND EVENING STARS.

Mercury, *Evening Star*; conjunction with Mars, 7th; with Sun, 13th; Moon, 17th; in perihelion, 28th.

Venus, *Morning Star*; in aphelion, 6th; conj. with Moon, 15th; Mars, 28th.

Mars, *Morning Star* throughout month; conjunction with Moon, 16th.

Jupiter, *Evening Star* throughout month; conjunction with Moon, 27th.

APRIL—30 DAYS.

D M	D W	MEMORANDA.	SUN.		MOON.		HIGH WATER.	
			RISES	SETS.	RISES.	SETS.	MORN.	AFTER.
			H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	W	Edin., Ben., & Staff. Socs.	5 37	6 31	8 47	6 28	2 53	3 12
2	TH	S. Lon., Bolton, Dundee,	5 35	6 33	9 52	6 57	3 31	3 48
3	F	[Leeds, & Lon. & Prov.	5 33	6 35	10 52	7 30	4 7	4 24
4	S	[S. Morse, of N.Y., d 1861	5 31	6 36	11 48	8 7	4 40	4 56
5	𝔖	EASTER SUNDAY	5 28	6 38	Morn	8 49	5 12	5 30
6	M	Yorkshire Photo. Society	5 26	6 40	0 38	9 36	5 49	6 11
7	TU	Sheffield & Glossop Socs.	5 24	6 41	1 23	10 28	6 34	6 57
8	W	Bury Photo. Society	5 22	6 43	2 2	11 24	7 25	7 56
9	TH	Manch. & Lond. & Prov.	5 20	6 45	2 36	After	8 33	9 14
10	F	Soc. of Ireland. Pouncy's	5 17	6 46	3 7	1 28	9 57	10 37
11	S	[Carbon Patent 1858	5 15	6 48	3 35	2 34	11 11	11 41
12	𝔖	LOW SUNDAY	5 13	6 50	4 2	3 43	—	0 9
13	M	Jena Photo. Soc. fnd.	5 11	6 51	4 28	4 55	0 33	0 54
14	TU	Gt. Brit., Newcastle, & W.	5 9	6 53	4 54	6 7	1 13	1 33
15	W	[of Scot. Socs.	5 6	6 55	5 23	7 22	1 52	2 9
16	TH	London & Prov. Society	5 4	6 56	5 55	8 37	2 26	2 46
17	F	[Liebig (chemist) d. '73	5 2	6 58	6 33	9 49	3 6	3 26
18	S	Hanfstängl d. '77. Justus	5 0	7 0	7 18	10 57	3 46	4 8
19	𝔖	2nd SUNDAY after EASTER	4 58	7 1	8 10	11 58	4 30	4 52
20	M	J. A. Spencer d. 1878	4 56	7 3	9 11	Morn	5 14	5 38
21	TU	[Statham d. 1884	4 54	7 5	10 18	0 50	6 4	6 32
22	W	Bristol Society. Rev. F. F.	4 52	7 6	11 29	1 34	7 4	7 37
23	TH	London & Prov. Society	4 50	7 8	After	2 10	8 12	8 53
24	F	Celsius d. 1744	4 48	7 9	1 54	2 42	9 36	10 18
25	S	*St. Mark*	4 46	7 11	3 5	3 10	10 53	11 27
26	𝔖	3rd SUNDAY after EASTER	4 44	7 13	4 16	3 36	11 59	—
27	M	S. Morse b. 1791	4 42	7 14	5 26	4 2	0 25	0 48
28	TU	Soc. Gt. Brit. Tech. Mtg.	4 40	7 16	6 33	4 29	1 10	1 32
29	W	[& Prov. Socs.	4 38	7 18	7 38	4 57	1 54	2 12
30	TH	L'pool, Oldham, & Lond.	4 36	7 19	8 40	5 28	2 30	2 48

MOON'S PHASES.

Last Quarter,	7th day, 2h. 43m. A.	*First Quarter,*	21st day, 11h. 20m. A.
New Moon,	15th day, 5h. 51m. M.	*Full Moon,*	29th day, 6h. 14m. M.

MORNING AND EVENING STARS.

Mercury, *Evening Star*; greatest E. elongation, 7th; conjunction with Moon, 16th; stationary, 17th; conjunction with Sun and Venus, 28th.

Venus sets on the 1st; conjunction with Moon, 14th.

Mars, *Morning Star* throughout month; conjunction with Moon, 14th.

Jupiter, *Evening Star* throughout month; stationary, 22nd.

MAY—31 DAYS.

D M	D W	MEMORANDA.	SUN.		MOON.		HIGH WATER.	
			RISES.	SETS.	RISES.	SETS.	MORN.	AFTER.
			H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	F	Mercury r. 4 17 m. David	4 34	7 21	9 39	6 3	3 5	3 22
2	S	[Livingstone d. 1873	4 32	7 23	10 32	6 43	3 40	3 58
3	𝔖	4th SUNDAY after EASTER	4 30	7 24	11 19	7 28	4 16	4 33
4	M	Yorkshire Photo. Society	4 28	7 26	Morn	8 18	4 49	5 5
5	Tu	Sheffield & Glossop Socs.	4 27	7 27	0 0	9 13	5 23	5 44
6	W	Edin., Ben., & Staff. Socs.	4 25	7 29	0 36	10 11	6 5	6 28
7	Th	S. Lond., Bolton, Dundee,	4 23	7 31	1 8	11 13	6 53	7 20
8	F	Soc. Irelnd. [Leeds, &L.&P.	4 21	7 32	1 36	After	7 49	8 23
9	S	Half-quarter Day	4 20	7 34	2 2	1 23	9 0	9 41
10	𝔖	ROGATION SUNDAY	4 18	7 35	2 28	2 32	10 16	10 49
11	M	H. Baden Pritchard d. '84	4 17	7 37	2 54	3 43	11 20	11 47
12	Tu	Gt. Brit. & Newcastle Socs.	4 15	7 38	3 22	4 57	—	0 11
13	W	Bury Soc. (Ann. Mtg.)	4 13	7 40	3 52	6 13	0 33	0 54
14	Th	Manch. & London & Prov.	4 12	7 41	4 27	7 28	1 17	1 40
15	F	Fahrenheit b. (14) 1686	4 10	7 43	5 9	8 41	2 0	2 21
16	S	Charles Breese d. 1875	4 9	7 44	5 59	9 48	2 43	3 6
17	𝔖	SUNDAY aft. ASCENSION	4 7	7 46	6 58	10 45	3 29	3 53
18	M	New Eddystn. Lighthouse	4 6	7 47	8 5	11 33	4 17	4 40
19	Tu	[opened 1882	4 5	7 49	9 17	Morn	5 6	5 31
20	W	[d. 1786	4 3	7 50	10 30	0 13	5 57	6 26
21	Th	Lon. & Prov. Soc. Scheele	4 2	7 52	11 44	0 46	6 56	7 27
22	F	Easter Law Sittings end	4 1	7 53	After	1 16	7 59	8 34
23	S	J. W. Gough d. 1878	4 0	7 54	2 7	1 42	9 12	9 48
24	𝔖	WHIT SUNDAY	3 58	7 56	3 16	2 7	10 22	10 56
25	M	Bank Holiday	3 57	7 57	4 23	2 33	11 28	11 57
26	Tu	Soc. Gt. Brit. Tech. Mtg.	3 56	7 58	5 29	3 0	—	0 22
27	W	Bristol Society [& Prov.	3 55	7 59	6 31	3 29	0 45	1 7
28	Th	L'pool, Oldham, & Lond.	3 54	8 1	7 31	4 2	1 29	1 50
29	F	Davy (chemist) d. 1829	3 53	8 2	8 26	4 40	2 8	2 26
30	S	P. P. Rubens d. 1640	3 52	8 3	9 16	5 23	2 43	3 1
31	𝔖	TRINITY SUNDAY	3 51	8 4	9 59	6 11	3 19	3 36

MOON'S PHASES.

Last Quarter,	7th day,	8h. 43m. M.	*First Quarter,*	21st day,	5h. 45m. M.
New Moon,	14th day,	3h. 18m. A.	*Full Moon,*	28th day,	8h. 31m. A.

MORNING AND EVENING STARS.

Mercury, *Morning Star* ; stationary, 10th ; in aphelion, 11th ; conjunction with Moon and Mars, 13th ; greatest W. elongation, 25th.

Venus, superior conjunction with Sun, 4th ; Neptune, 11th ; Moon, 14th.

Mars, *Morning Star* ; conjunction with Moon, 12th.

Jupiter, *Evening Star* ; in quadrature with Sun, 17th ; conj. with Moon, 21st.

JUNE—30 DAYS.

D M	D W	MEMORANDA.	SUN.		MOON.		HIGH WATER.	
			RISES.	SETS.	RISES.	SETS.	MORN.	AFTER.
			H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	M	First Amer. Conven. 1869	3 51	8 5	10 36	7 4	3 54	4 12
2	Tu	Sheffield & Glossop Socs.	3 50	8 6	11 10	8 1	4 28	4 45
3	W	Edin., Staff., & Benv. Socs.	3 49	8 7	11 39	9 1	5 3	5 21
4	Th	S. Lond., Bolton, Leeds, &	3 48	8 8	Morn	10 3	5 41	6 2
5	F	[Lond. & Prov. Socs.	3 48	8 9	0 6	11 7	6 24	6 49
6	S	Fordos (dis. salts of gold)	3 47	8 10	0 31	After	7 14	7 42
7	𝕾	1st Sun. a. Trinity [d.'78	3 47	8 11	0 55	1 22	8 13	8 45
8	M	Fraunhofer d. 1826	3 46	8 12	1 21	2 33	9 20	9 53
9	Tu	Society of Great Britain	3 46	8 12	1 49	3 46	10 27	10 57
10	W	Bury Photo. Society	3 45	8 13	2 21	5 2	11 27	11 57
11	Th	London & Prov. Society	3 45	8 14	2 59	6 17	—	0 23
12	F	Niepce's Alb. Proc.pub.'48	3 45	8 15	3 45	7 28	0 47	1 11
13	S	Battle of Elmina 1873	3 44	8 15	4 39	8 32	1 37	2 1
14	𝕾	2nd Sunday after Trinity	3 44	8 16	5 44	9 26	2 25	2 51
15	M	Proposal made in French	3 44	8 16	6 56	10 11	3 16	3 41
16	Tu	[Legis. to pur. Daguer-	3 44	8 17	8 13	10 48	4 6	4 32
17	W	[reotype Process 1839	3 44	8 17	9 29	11 20	4 57	5 22
18	Th	London & Prov. Society	3 44	8 17	10 44	11 47	5 46	6 13
19	F	Abbé Laborde d. 1883	3 44	8 18	11 56	Morn	6 40	7 9
20	S	Accession Q. Victoria '37	3 44	8 18	After	0 13	7 38	8 6
21	𝕾	3rd Sunday after Trinity	3 45	8 18	2 15	0 39	8 37	9 10
22	M	Brazilian Cable laid 1874	3 45	8 18	3 21	1 5	9 45	10 17
23	Tu	Soc. Gt. Brit. Tech. Mtg.	3 45	8 19	4 24	1 33	10 51	11 23
24	W	Bristol Society [& Prov.	3 45	8 19	5 25	2 4	11 53	—
25	Th	L'pool, Oldham, & Lond.	3 46	8 19	6 21	2 40	0 20	0 43
26	F	W. B. Woodbury b. 1834	3 46	8 19	7 12	3 21	1 6	1 28
27	S	J. Wothly d 1873	3 47	8 19	7 58	4 7	1 49	2 7
28	𝕾	4th Sunday after Trinity	3 47	8 18	8 38	4 58	2 25	2 44
29	M	Rubens b. 1577	3 48	8 18	9 13	5 53	3 1	3 17
30	Tu	Great Comet 1861	3 48	8 18	9 44	6 52	3 34	3 53

MOON'S PHASES.

Last Quarter,	6th day, 0h. 5m. M.	*First Quarter,*	19th day, 1h. 49m. A.
New Moon,	12th day, 10h. 42m. A.	*Full Moon,*	27th day, 11h. 18m. M.

MORNING AND EVENING STARS.

Mercury, *Morning Star* greater part of month; conjunction with Moon 11th; with Saturn, and in perihelion, 24th; sup. conjunction with Sun, 27th.

Venus, *Evening Star*; conj. with Saturn, 7th; Moon, 13th; in perihelion, 26th.

Mars, *Morning Star* throughout month; conjunction with Moon, 11th.

Jupiter, *Evening Star* throughout month; conjunction with Moon, 17th.

JULY—31 DAYS.

D M	D W	EMORANDA.	Sun.		Moon.		High Water.	
			Rises.	Sets.	Rises.	Sets.	Morn.	After.
			H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	W	Staff. & Benev. Societies	3 49	8 18	10 11	7 54	4 10	4 27
2	Th	Bolton, Leeds, & Lond. &	3 50	8 17	10 36	8 57	4 44	5 1
3	F	Bat. Sadowa '66 [Prov.	3 50	8 17	11 0	10 2	5 20	5 37
4	S	P. Remele d. 1883	3 51	8 17	11 25	11 8	5 58	6 19
5	S̶	5th Sunday aft. Trinity	3 52	8 16	11 51	After	6 42	7 6
6	M	Prs. Vict. of W. b. 1868	3 53	8 16	Morn	1 26	7 32	8 0
7	Tu	Sheffield & Glossop Socs.	3 54	8 15	0 19	2 38	8 30	9 4
8	W	Bury Photo. Society	3 54	8 14	0 53	3 51	9 41	10 16
9	Th	London & Prov. Society	3 55	8 14	1 33	5 3	10 48	11 23
10	F	Louis Daguerre died 1851	3 56	8 13	2 22	6 12	11 56	—
11	S	Wedgwood b. (12) 1730	3 57	8 12	3 21	7 11	0 25	0 52
12	S̶	6th Sunday after Trinity	3 59	8 11	4 30	8 2	1 20	1 47
13	M	Abbé Moigno d. 1884	4 0	8 10	5 46	8 44	2 13	2 38
14	Tu	Dumas (chemist) b. 1800	4 1	8 10	7 4	9 19	3 5	3 30
15	W	Flight of Mahomet 622	4 2	8 9	8 22	9 50	3 54	4 19
16	Th	London & Prov. Soc. A.	4 3	8 8	9 39	10 17	4 43	5 6
17	F	[Claudet b. 1797	4 4	8 7	10 52	10 43	5 29	5 53
18	S	Griswold d. 1872	4 6	8 5	After	11 11	6 17	6 39
19	S̶	7th Sunday after Trinity	4 7	8 4	1 10	11 38	7 3	7 29
20	M	[ist) b. 1810	4 8	8 3	2 15	Morn	7 56	8 25
21	Tu	Victor Regnault (physic-	4 9	8 2	3 17	0 8	8 57	9 32
22	W	Lon. & Prov. Indian Bill	4 11	8 1	4 16	0 42	10 11	10 46
23	Th	Bristol Society [passed '58	4 12	8 0	5 9	1 21	11 19	11 51
24	F	W. de W. Abney b. 1843	4 13	7 58	5 56	2 4	—	0 19
25	S	Capt. Webb drowned '83	4 15	7 57	6 38	2 53	0 44	1 8
26	S̶	8th Sun. a. Trin. Niepce	4 16	7 55	7 15	3 47	1 30	1 49
27	M	[de St. Victor b. 1806	4 18	7 54	7 47	4 46	2 8	2 25
28	Tu	Soc. Gt. Brit. Tech. Mtg.	4 19	7 52	8 16	5 47	2 42	2 58
29	W	[Prov. Socs.	4 21	7 51	8 42	6 49	3 15	3 31
30	Th	L'pool, Oldham, & Lon. &	4 22	7 49	9 7	7 53	3 48	4 5
31	F	St. Helena dis. 1502	4 24	7 48	9 31	8 59	4 22	4 40

MOON'S PHASES.

Last Quarter,	5th day, 0h. 26m. A.	*First Quarter,*	19th day, 0h. 20m. M.
New Moon,	12th day, 5h. 16m. M.	*Full Moon,*	27th day, 2h. 23m. M.

MORNING AND EVENING STARS.

Mercury, *Evening Star* throughout month; conjunction with Moon, 13th; Venus, 17th.

Venus, *Evening Star* throughout month; conjunction with Moon, 13th.

Mars, *Morning Star* throughout month; conjunction with Moon, 9th.

Jupiter, *Evening Star* throughout month; conjunction with Moon, 15th.

AUGUST—31 DAYS.

D M	D W	MEMORANDA.	SUN.				MOON.				HIGH WATER.			
			RISES.		SETS.		RISES.		SETS.		MORN.		AFTER.	
			H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
1	S	*Lammas Day*	4	26	7	46	9	55	10	6	4	56	5	12
2	𝔖	9th SUNDAY AFTER TRINITY	4	27	7	44	10	22	11	14	5	31	5	50
3	M	Bank Holiday	4	28	7	43	10	53	After		6	11	6	33
4	Tu	Sheffield & Glossop Socs.	4	30	7	41	11	29	1	33	6	59	7	25
5	W	Staff. & Benev. Societies	4	31	7	39	Morn		2	43	7	53	8	26
6	Th	Bolton, Leeds, & Lond. &	4	33	7	38	0	12	3	51	9	3	9	44
7	F	[Prov. Societies	4	34	7	36	1	5	4	54	10	22	11	1
8	S	Trinity Law Sittings end	4	36	7	34	2	7	5	49	11	38	—	
9	𝔖	10th SUNDAY AFT. TRINITY	4	37	7	32	3	19	6	35	0	12	0	43
10	M	J. Hughes died 1884	4	39	7	30	4	36	7	14	1	10	1	38
11	Tu	Half-quarter Day	4	40	7	28	5	55	7	48	2	3	2	27
12	W	Bury Photo. Society	4	42	7	26	7	13	8	18	2	50	3	14
13	Th	London & Prov. Society	4	44	7	24	8	30	8	45	3	37	3	59
14	F	Jupiter souths 1 19 a.	4	45	7	23	9	44	9	12	4	22	4	43
15	S	Gas first in London 1807	4	47	7	21	10	55	9	41	5	4	5	23
16	𝔖	11th SUNDAY AFT. TRINITY	4	48	7	19	After		10	10	5	44	6	6
17	M	Great Comet 1682	4	50	7	17	1	7	10	43	6	27	6	50
18	Tu	Battle Gravelotte 1870	4	52	7	15	2	7	11	20	7	14	7	40
19	W	[Tyndall b. 1820	4	53	7	13	3	2	Morn		8	10	8	43
20	Th	London & Prov. Soc. J.	4	55	7	11	3	52	0	2	9	22	10	3
21	F	Chevreul b. 1786	4	56	7	8	4	37	0	49	10	43	11	18
22	S	Roger Fenton d. 1869	4	58	7	6	5	15	1	41	11	51	—	
23	𝔖	12th SUN. A. TRIN. [d.'67	5	0	7	4	5	49	2	38	0	20	0	45
24	M	J.A.Cutting (inv. Ambro.)	5	1	7	2	6	19	3	37	1	7	1	26
25	Tu	Soc. Gt. Brit. Tech. Mtg.	5	3	7	0	6	46	4	40	1	45	2	2
26	W	Bristol Society	5	4	6	58	7	12	5	45	2	19	2	36
27	Th	L'pool, Oldham, & Lon. &	5	6	6	56	7	36	6	51	2	51	3	7
28	F	Bat. of Leipsic '13 [Prov.	5	7	6	54	8	1	7	57	3	23	3	40
29	S	Varrentrapp born.	5	9	6	51	8	27	9	5	3	58	4	14
30	𝔖	13th SUNDAY AFT. TRINITY	5	10	6	49	8	57	10	14	4	32	4	48
31	M	Helmholtz b. 1821	5	12	6	47	9	31	11	23	5	6	5	24

MOON'S PHASES.

Last Quarter,	3rd day, 9h. 55m. A.	*First Quarter,*	17th day, 1h. 47m. A.
New Moon,	10th day, 0h. 14m. A.	*Full Moon,*	25th day, 5h. 25m. A.

MORNING AND EVENING STARS.

Mercury, *Evening Star* greater part of month; conjunction with Jupiter, 4th; greatest E. elongation, 6th; in aphelion, 7th; conjunction with Venus, 8th; Moon, 12th; stationary, 19th.

Venus, *Evening Star* throughout month; conjunction with Jupiter, 6th; Moon, 12th.

Mars, *Morning Star* throughout month.

SEPTEMBER—30 DAYS.

D M	D W	MEMORANDA.	SUN.				MOON.				HIGH WATER.			
			RISES.		SETS.		RISES.		SETS.		MORN.		AFTER.	
			H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
1	TU	Sheffield & Glossop Socs.	5	13	6	45	10	10	0	32	5	45	6	7
2	W	Staff. & Benev. Societies	5	15	6	43	10	58	1	39	6	30	6	58
3	TH	Glasgow, Bolton, Leeds, &	5	17	6	40	11	54	2	41	7	28	8	2
4	F	[Lon. & Prov. Socs.	5	19	6	38	Morn		3	38	8	40	9	23
5	S	Malta captured 1800	5	20	6	36	0	58	4	26	10	7	10	48
6	𝕾	14th SUNDAY AFT. TRINITY	5	22	6	34	2	10	5	7	11	27	—	
7	M	[by Dr. Maddox	5	23	6	31	3	27	5	43	0	3	0	32
8	TU	Gel.-Bromide Process pub.	5	25	6	29	4	45	6	15	0	58	1	24
9	W	Bury Photo. Society	5	27	6	27	6	3	6	44	1	48	2	12
10	TH	Manch. & Lon. & Prov.	5	28	6	24	7	19	7	11	2	33	2	55
11	F	*PhotographicNews* fnd.(10)	5	30	6	22	8	33	7	39	3	15	3	35
12	S	[1858	5	31	6	20	9	44	8	9	3	55	4	16
13	𝕾	15th SUNDAY AFT. TRINITY	5	33	6	17	10	52	8	42	4	35	4	54
14	M	*Holy Cross*	5	35	6	15	11	55	9	18	5	12	5	30
15	TU	I. K. Brunel d. 1859	5	36	6	13	After		9	58	5	49	6	11
16	W	['81. Fox Talbot d. '77	5	38	6	11	1	46	10	43	6	33	6	57
17	TH	Lon. & Prov. F. Haugk d.	5	39	6	8	2	33	11	34	7	24	7	57
18	F	Leon Foucault b. 1819	5	41	6	6	3	13	Morn		8	33	9	15
19	S	Battle of Poictiers 1356	5	43	6	4	3	48	0	29	9	58	10	39
20	𝕾	16th SUNDAY AFTER TRINITY	5	44	6	1	4	20	1	27	11	15	11	47
21	M	Stas born 1813	5	46	5	59	4	48	2	29	—		0	13
22	TU	Soc. Gt. Brit. Tech. Mtg.	5	47	5	57	5	15	3	33	0	37	0	57
23	W	Bristol Society [Prov.	5	49	5	54	5	40	4	38	1	16	1	36
24	TH	L'pool, Oldham, & Lon. &	5	51	5	52	6	6	5	45	1	52	2	7
25	F	Dr. Monckhoven b. 1834,	5	52	5	50	6	32	6	54	2	22	2	39
26	S	[d. 1882	5	54	5	48	7	0	8	4	2	57	3	13
27	𝕾	17th SUNDAY AFT. TRINITY	5	56	5	45	7	32	9	14	3	30	3	48
28	M	H. Negretti d. 1879	5	57	5	43	8	10	10	24	4	6	4	25
29	TU	Michaelmas Day	5	59	5	41	8	55	11	32	4	43	5	2
30	W	Balard (disc. Br.) b. 1802	6	1	5	38	9	47	After		5	24	5	47

MOON'S PHASES.

Last Quarter,	2nd day, 5h. 15m. M.	*First Quarter,*	16th day, 6h. 15m. M.
New Moon,	8th day, 8h. 43m. A.	*Full Moon,*	24th day, 7h. 55m. M.

MORNING AND EVENING STARS.

Mercury, *Morning Star* from middle of month; inferior conjunction with Sun, 2nd; conjunction with Moon, 8th; stationary, 11th; greatest W. elongation, 18th; in perihelion, 20th; conjunction with Jupiter, 27th.

Venus, *Evening Star* throughout month; conjunction with Moon 11th.

Mars, *Morning Star*; conjunction with Moon, 5th.

Jupiter, conjunction with Moon and Sun, 8th.

OCTOBER—31 DAYS.

D M	D W	MEMORANDA.	Sun. Rises. H.	M.	Sun. Sets. H.	M.	Moon. Rises. H.	M.	Moon. Sets. H.	M.	High Water. Morn. H.	M	High Water. After. H.	M.
1	Th	S. London, Bolton, Leeds,	6	2	5	36	10	48	1	33	6	11	6	41
2	F	[Dundee, & Lon. & Prov.	6	4	5	34	11	56	2	22	7	12	7	47
3	S	Arago d. 1853	6	5	5	32	Morn		3	4	8	27	9	11
4	𝔖	18th Sunday aft. Trinity	6	7	5	29	1	9	3	41	9	58	10	39
5	M	Yorkshire Photo. Society	6	9	5	27	2	25	4	14	11	17	11	50
6	Tu	Sheffield & Glossop Socs.	6	10	5	25	3	41	4	43	—		0	20
7	W	Edin., Staff., & Ben. Socs.	6	12	5	23	4	56	5	10	0	44	1	7
8	Th	Manch. & Lon. & Prov.	6	14	5	20	6	10	5	38	1	31	1	51
9	F	Society of Ireland	6	15	5	18	7	23	6	7	2	12	2	32
10	S	Treaty of Vienna 1866	6	17	5	16	8	33	6	38	2	51	3	11
11	𝔖	19th Sunday aft. Trinity	6	19	5	14	9	39	7	13	3	29	3	47
12	M	Gmelin b. 1792	6	21	5	12	10	41	7	52	4	7	4	24
13	Tu	Newcstl. & W. Scot. Socs.	6	22	5	9	11	37	8	36	4	41	4	59
14	W	Fire Insurance expires	6	24	5	7	After		9	24	5	18	5	36
15	Th	London & Prov. Society	6	26	5	5	1	9	10	18	5	57	6	19
16	F	Houses Parl. burnt 1834	6	27	5	3	1	47	11	15	6	46	7	15
17	S	Reaumur d. 1757	6	22	5	1	2	20	Morn		7	48	8	24
18	𝔖	20th Sunday after Trinity	6	31	4	59	2	49	0	15	9	6	9	48
19	M	Sir C. Wheatstone d. 1875	6	33	4	57	3	16	1	17	10	25	11	0
20	Tu	Venus souths 2 33 a.	6	34	4	55	3	41	2	22	11	32	11	56
21	W	Bristol Soc. (Ann. Mtg.)	6	36	4	53	4	6	3	29	—		0	20
22	Th	London & Prov. Society	6	38	4	51	4	32	4	37	0	41	1	0
23	F	First Stone of first Pillar	6	40	4	49	5	0	5	47	1	18	1	35
24	S	[Roy. Exch. ld. 1667	6	41	4	47	5	31	6	59	1	54	2	11
25	𝔖	21st Sunday aft. Trinity	6	43	4	45	6	7	8	12	2	29	2	47
26	M	Count Moltke b. 1800	6	45	4	43	6	51	9	23	3	6	3	24
27	Tu	Soc. Gt. Brit. Tech. Mtg.	6	47	4	41	7	42	10	29	3	44	4	5
28	W	"Carte" Portrait sug. '54	6	48	4	39	8	41	11	29	4	26	4	48
29	Th	L'pool, Oldham, & Lon. &	6	50	4	37	9	47	After		5	10	5	35
30	F	[Prov. Socs.	6	52	4	35	10	57	1	6	6	1	6	29
31	S	All Hallow's Eve	6	54	4	33	Morn		1	44	7	2	7	39

MOON'S PHASES.

Last Quarter,	1st day, 11h. 29m. M.	*First Quarter,*	16th day, 1h. 21m. M.
New Moon,	8th day, 7h. 31m. M.	*Full Moon,*	23rd day, 2h. 23m. A.

Last Quarter, 30th day, 5h. 58m. A.

MORNING AND EVENING STARS.

Mercury, *Morning Star* first part of month; conjunction with Moon, 7th; superior conjunction with sun, 16th.

Venus, *Evening Star* throughout month; conj. with Moon, 11th; in aph. 17th.

Mars, *Morning Star* throughout month; conjunction with Moon, 3rd.

Jupiter, *Morning Star* throughout month. **Saturn,** in perihelion, 20th.

NOVEMBER—30 DAYS.

D M	D W	MEMORANDA.	Sun. Rises. H.	M.	Sun. Sets. H.	M.	Moon. Rises. H.	M.	Moon. Sets. H.	M.	High Water. Morn. H.	M.	High Water. After. H.	M.
1	𝔖	22nd SUNDAY aft. TRINITY	6	56	4	31	0	12	2	15	8	17	9	0
2	M	Yorkshire Photo. Society	6	57	4	29	1	26	2	44	9	43	10	22
3	Tu	Sheffield & Glossop Socs.	6	59	4	28	2	40	3	12	10	56	11	30
4	W	Edin., Ben., & Staff. Socs.	7	1	4	26	3	53	3	39	11	59	—	
5	Th	S. Lond., Bolton, Dundee,	7	3	4	24	5	5	4	7	0	24	0	47
6	F	[Leeds, & Lon. & Prov.	7	4	4	22	6	15	4	36	1	10	1	32
7	S	Dr. Bois-Reymond b. '18	7	6	4	21	7	22	5	9	1	51	2	11
8	𝔖	23rd SUNDAY aft. TRINITY	7	8	4	19	8	27	5	46	2	29	2	47
9	M	Prince of Wales b. 1841	7	10	4	18	9	26	6	28	3	6	3	24
10	Tu	Gt. Brit., Newc., & W. of	7	12	4	16	10	19	7	14	3	43	4	1
11	W	Bury Society [Scot. Socs.	7	13	4	14	11	6	8	6	4	17	4	35
12	Th	Manch. & Lond. & P. Socs.	7	15	4	13	11	46	9	2	4	52	5	10
13	F	Society of Ireland	7	17	4	12	After		10	1	5	30	5	52
14	S	G. W. Leibnitz d. 1716	7	19	4	10	0	50	11	2	6	14	6	38
15	𝔖	24th SUNDAY aft. TRINITY	7	20	4	9	1	18	Morn		7	5	7	33
16	M	[Photo. Soc.) d. 1875	7	22	4	7	1	43	0	5	8	7	8	44
17	Tu	C. B. Vignoles (fndr. Lon.	7	24	4	6	2	8	1	9	9	24	10	0
18	W	Daguerre b. 1787	7	25	4	5	2	33	2	16	10	34	11	6
19	Th	London & Prov. Society	7	27	4	4	2	59	3	25	11	34	11	58
20	F	Prof. Draper d. 1882, at	7	29	4	2	3	28	4	36	—		0	20
21	S	[age of 45	7	30	4	1	4	2	5	49	0	41	1	2
22	𝔖	25th SUNDAY af. TRIN.	7	32	4	0	4	43	7	3	1	24	1	44
23	M	Harrison (globe lens) d.'64	7	34	3	58	5	31	8	14	2	4	2	25
24	Tu	Soc. Gt. Brit. Tech. Mtg.	7	35	3	57	6	29	9	20	2	46	3	6
25	W	Bristol Society [& Prov.	7	37	3	56	7	34	10	17	3	28	3	52
26	Th	L'pool Oldham (An.), & L.	7	38	3	55	8	46	11	6	4	16	4	38
27	F	A. Celsius born 1701, in	7	40	3	55	10	1	11	47	5	3	5	28
28	S	[Upsala	7	41	3	54	11	16	After		5	56	6	24
29	𝔖	ADVENT SUNDAY. F. W.	7	43	3	54	Morn		0	50	6	53	7	25
30	M	Window d. 1875	7	44	3	53	0	30	1	18	7	59	8	34

MOON'S PHASES.

New Moon,	6th day, 9h. 3m. A.	*Full Moon,*	22nd day, 9h. 39m. M.
First Quarter,	14th day, 10h. 0m. A.	*Last Quarter,*	29th day, 1h. 57m. M.

MORNING AND EVENING STARS.

Mercury, *Evening Star* throughout month; in aphelion, 3rd; conjunction with Moon, 7th; greatest E. elongation, 30th.

Venus, *Evening Star* throughout month; conjunction with Moon, 10th.

Mars, *Morning Star* throughout month; conjunction with Moon, 29th.

Jupiter, *Morning Star* throughout month; conjunction with Moon, 3rd and 30th.

DECEMBER—31 DAYS.

D M	D W	MEMORANDA.	SUN.				MOON.				HIGH WATER.			
			RISES.		SETS.		RISES.		SETS.		MORN.		AFTER.	
			H.	M.	H.	M.	H.	M.	H.	M	H.	M.	H.	M.
1	TU	Sheffield & Glossop Socs.	7	45	3	53	1	42	1	44	9	15	9	52
2	W	Edin., Ben., & Staff. Socs.	7	47	3	52	2	53	2	10	10	26	10	58
3	TH	S. Lond., Bolton, Dundee,	7	49	3	51	4	3	2	38	11	30	11	58
4	F	[Leeds, & Lon. & Prov.	7	50	3	51	5	11	3	9	—		0	23
5	S	Rome made Cap. Italy '70	7	51	3	50	6	16	3	43	0	49	1	11
6	$	2nd SUNDAY IN ADVENT	7	52	3	50	7	17	4	22	1	33	1	53
7	M	Yorkshire Photo. Society	7	54	3	50	8	12	5	7	2	12	2	30
8	TU	Gt. Brit., Newc., & W. of	7	55	3	50	9	2	5	57	2	47	3	5
9	W	Bury Society [Scot. Socs.	7	56	3	49	9	44	6	51	3	23	3	42
10	TH	Manch. & Lon. & Prov.	7	57	3	49	10	21	7	49	3	59	4	17
11	F	Society of Ireland.	7	58	3	49	10	54	8	50	4	32	4	49
12	S	J. B. Reade d. 1870	7	59	3	49	11	22	9	52	5	8	5	26
13	$	3rd SUNDAY IN ADVENT	8	0	3	49	11	47	10	55	5	45	6	8
14	M	Daguerre-Niepce Agmnt.	8	1	3	49	After		11	58	6	29	6	54
15	TU	L. Agassiz d. 1873 [1829	8	2	3	49	0	35	Morn		7	20	7	47
16	W	Th. Ross d. 1870	8	3	3	49	1	0	1	4	8	18	8	52
17	TH	Lond. & Prov. Davy b.	8	3	3	49	1	26	2	12	9	28	10	3
18	F	[1778	8	4	3	50	1	56	3	23	10	35	11	7
19	S	J. Mawson d. 1867	8	5	3	50	2	33	4	34	11	37	—	
20	$	4th SUNDAY IN ADVENT	8	6	3	50	3	17	5	49	0	3	0	28
21	M	Shortest Day	8	6	3	51	4	10	6	59	0	53	1	19
22	TU	Soc. Gt. Brit. Tech. Mtg.	8	7	3	51	5	13	8	2	1	41	2	6
23	W	Bristol Photo. Society	8	7	3	52	6	25	8	57	2	30	2	53
24	TH	Lond. & Prov. Society	8	7	3	53	7	42	9	44	3	17	3	41
25	F	CHRISTMAS DAY	8	8	3	53	9	0	10	23	4	6	4	32
26	S	Bank Holiday	8	8	3	54	10	17	10	56	4	57	5	20
27	$	1st SUNDAY AFT. CHRISTMAS	8	8	3	55	11	32	11	24	5	45	6	12
28	M	J. T. Goddard d. 1866	8	8	3	56	Morn		11	50	6	38	7	4
29	TU	W. E. Gladstone b. 1809	8	8	3	57	0	44	After		7	33	8	3
30	W	J. H. Dallmeyer d.'83 [P.	8	9	3	57	1	54	0	44	8	35	9	9
31	TH	L'pool, Oldham, & Lon. &	8	9	3	58	3	2	1	13	9	46	10	22

MOON'S PHASES.

New Moon,	6th day, 1h. 17m. A.	*Full Moon,*	21st day, 8h. 59m. A.
First Quarter,	14th day, 6h. 22m. A.	*Last Quarter,*	28th day, 0h. 22m. A.

MORNING AND EVENING STARS.

Mercury, *Evening Star* first half of month; stationary, 9th; in perihelion, 17th; inferior conjunction with Sun, 19th.

Venus, *Evening Star* throughout month; greatest E. elongation, 9th; conjunction with Moon, 10th.

Mars, rises on 1st; quadrature with Sun, 4th.

Jupiter *Morning Star* throughout month; conjunction with Moon, 28th.

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Foreign Photographic Societies.

NEW ZEALAND.—Wellington Amateur Photographic Society—*President*: Dr. Hutchinson; *Secretary*—W. Williams. Auckland Photographic Society—*President*—J. M. Clarke; *Vice-Presidents*—W. J. Hurst, M.H.R., and John Chambers; *Secretary*—J. H. Sinclair; *Treasurer*—Clement Bartley.

FRANCE.—Société Française de Photographie (Paris)—*President*: M. Péligot. Société Photographique de Toulouse—*President*: M. Sipierre. Chambre Syndicale de la Photographie (Paris)—*President*: T. Lévy. Société Nantoise de Photographie (Nantes)—*President*: M. Bascher. Société Photographique du Sud-Ouest, Augoulême—*President*: Count Laurencie; *Secretary*: Mr. F. Braun. Société Versaillaise de Photographie—*President*: M. de Sivry.

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NORWAY.—Photographischer Verein (Christiania)—*President*: H. Abel. Fotographiske Selskab—*President*: M. L. Szacinski.

AUSTRIA (VIENNA).—Photographische Gesellschaft (in Wien)—*Pres.*: Dr. E. Hornig. Verein Photographischer Mitarbeiter (in Wien)—*Pres.*: H. Lenhard.

GERMANY.—Verein zur Förderung der Photographie in Berlin—*Pres.*: Dr. H. Vogel. Photographischer Verein zu Berlin—*Pres.*: Dr. F. Stolze. Photographische Gesellschaft zu Hamburg (Altona)—*Pres.*: G. Wolf. Verein zur Pflege der Photographie und verwandter Künste in Frankfurt—*Pres.*: W. Hetzer. Photographischer Verein zu Bremen—*Sec.*: J. Herzog. Rheinisch-Westphälischer Verein zur Pflege der Photographie und verwandter Künste zu Köln—*Pres.*: C. Baumann. Verein der Photographen-Gehilfen zu Berlin—*Pres.*: P. Genthe. Deutscher Photographen-Verein (Weimar)—*Pres.*: K. Schwier. Internationaler Photographen Verein, Victoria, at Guben—*Pres.*: J. Pfeiffer. Kasseler Photographen-Verein—*Pres.*: Prof. Roux. Photographen Verein zu Nürnberg—*Pres.*: J. C. Schmidt, Jun. Münchener Photographische Gesellschaft—*Pres.*: O. Perutz. Schleswig-Holsteinischer Photographen-Verein (Flensburg)—*Pres.*: J. Koch.

RUSSIA.—Russian Photo. Society (St. Petersburg)—*Pres.*: Lt.-Gen. D. Birkin.

AMERICA.—Photographers' Association of America—*Pres.*: James Landy. Photographic Section of American Inst. (N.Y.)—*Pres.*: H. J. Newton. Society of Amateur Photographers of New York—*President*: F. C. Beach; *Secretary*: C. W. Caufield, 1,321, Broadway. Boston Photographic Association—*Pres.*: E. Foss. German Photographic Society (N.Y.)—*Pres.*: Theo. Gubelman. Brooklyn Photographic Art Association (N.Y.)—*Pres.*: G. F. Van Doren. Maryland Photographic Association (Baltimore)—*Pres.*: E. Busey. Photographic Society of Philadelphia—*Pres.*: J. W. Bates. Photographic Association of the District of Columbia (Washington)—*Pres.*: E. J. Pullmann. Pensylvania Photographic Association (Philadelphia)—*Pres.*: J.C. Keinmann. New Orleans Photographic Association—*Pres.*: ——. Louisville Photographic Society—*Pres.*: Mr. Klauber. Chicago Photographic Association—*Pres.*: F. H. Davies. Indianapolis Photographic Association—*Pres.*: D. O. Adams. Photographic Association of Western Illinois (Galesburg)—*Pres.*: S. T. Bryan. Buffalo Photographic Association—*Pres.*: J. Samo. Photographic Art Society of the Pacific (SanFrancisco)—*Pres.*: J. Shew. Association of Operative Photographers (New York)—*Pres.*: C. Schaidner. Photographic Society of Boston—*Pres.*: W. Parkinson. Rochester (New York) Photographic Association—*Pres.*: J. *M.* Trop; *Secretary*: W. D. Lee. St. Louis Photographic Association—*President*: Gustave Cramer. Detroit Photographic Association—*President*:

Jex. Bardwell. Brooklyn Amateur Photographic Club—*President*: Lewis Atkinson. Boston Society of Amateur Photographers—*President*: W. T. Brigham. Chicago Amateur Club—*President*: Dr. H. D. Garrison. The "Argents," Washington, D.C.—*Secretary*: S. L. Philips.

Foreign Photographic Journals.

French.

Bulletin de la Société Française de Photographie, published in Paris. Monthly.
Le Moniteur de la Photographie, published in Paris. Fortnightly.
Revue Photographique, published in Paris. Monthly.
Journal de l'Industrie Photographique, published in Paris. Monthly.
Le Progrès Photographique, published in Paris. Monthly.

German
Photographisches Archiv, published in Düsseldorf. Fortnightly.
Photographische Mittheilungen, published in Berlin. Fortnightly.
Photographisches Wochenblatt, published in Berlin. Weekly.
Deutsche Photographen-Zeitung, published in Weimar. Weekly.

American.

The Philadelphia Photographer, published in Philadelphia. Monthly.
Anthony's Photographic Bulletin, published in New York. Monthly.
Photographic Times, published in New York. Monthly.
Walzl's Monthly, published in Baltimore.
The St. Louis Photographer, published in St. Louis. Monthly.
The Photographic Eye, published in Chicago. Weekly.

Dutch.

Tidschrift voor Photographie, published in Amsterdam. Monthly.
De Navorscher op het Gebied der Photographie, published in Amsterdam. Monthly.

Belgian.

Bulletin de l'Association Belge de Photographie, published in Brussels. Monthly.

Austrian
Photographische Correspondenz, published in Vienna. Monthly.
Photographische Notizen, published in Vienna. Monthly.

Danish.

Organ Beretninger fur Dansk Fotografisk Forening, pub. in Copenhagen. Quarterly.

Italian—
Rivista Fotografica Universale, published in Brindisi. Monthly.
Camera Oscura, published in Florence. Monthly.

Spanish—*Boletin Fotografico*, published in Havannah. Monthly.
Potuguese—*A Arte Photographica*, published at Oporto. Monthly.

Foreign Year-books.

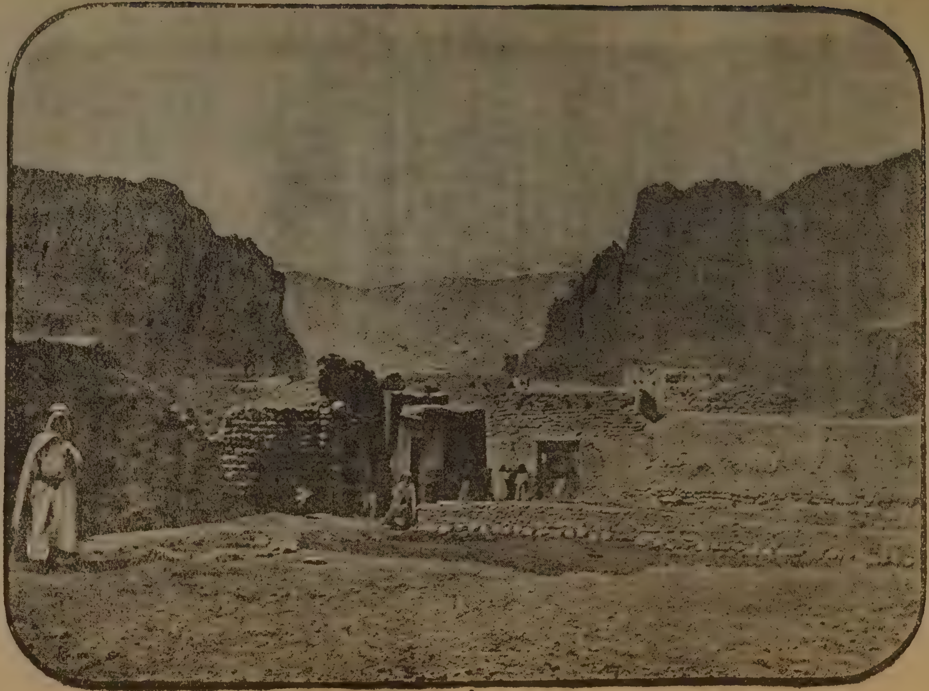
Photographisches Jahrbuch (Vienna).
Annuaire Photographique (Paris).
Photographic Mosaics (Philadelphia).
Deutscher Photographen Kalender (Weimar).
Photographischer Almanach und Kalender (Düsseldorf).
Aide Mémoire de Photographie (Paris).
Agenda de l'Association Belge (Brussels).

PIPER and CARTER's series of Photographic Handy-Books, embodying modern treatises on all important branches of Photography, and the writings of the best and most practical of photographic workers. Complete List by post.—5, Castle Street, Holborn, London, E.C.

Annals of Photography for 1884.

As far as the technical advance of photography during the year 1884 is concerned, good progress is to be reported; but death has been exceptionally active in photographic circles. The death of John Henry Dallmeyer, which took place off the coast of New Zealand on the last day but one of the year 1883, may be placed to the account of the New Year as far as our Annals are concerned, as news did not reach England till after the first week in 1884. Next on the list comes the Rev. F. F. Statham, who died at his residence in Walworth on the 22nd of April. For twenty-five years Mr. Statham had presided over the South London Photographic Society, and it had been arranged to give a dinner to commemorate the circumstance, but death came first. Not a month had elapsed before Henry Baden Pritchard was struck down; his death taking place on the 11th of May. Mr. Pritchard had not long returned from a trip in Algeria, his accounts of the photographic aspects of the excursion being embodied in a series of articles which were published in the PHOTOGRAPHIC NEWS during February and March. Several of the photographs taken by Mr. Pritchard during his last tour have been since issued as supplements to the PHOTOGRAPHIC NEWS, and we now reproduce one of them as a Meisenbach block. The view is of El Kantara, a Station on the confines of the Sahara Desert. Cornelius Jabez Hughes followed next, his death taking place on the 11th of August, after a long period of weakness and illness; and the next loss we have to record is the death of Henry E. Anthony, of New York, one of the first to practise the photographic art in the New World; this took place on the 11th of October. On the 5th of the following month Mr. J. Hubbard died, well-known as an exhibitor at the Photographic Society, and to whom a medal was awarded at the last exhibition; while in December (the 7th), occurred the death of Mr. H. Nathaniel White, well known as a hard-working amateur, and a medallist for photographs on enamel. Also that of Mr. Henry Greenwood, of Liverpool (on the 16th).

That revival of photo-block printing methods which characterised the year 1883, has borne fruit in 1884; as at the time we write, many publishers in London are regularly using blocks made from original photographs as a substitute for wood engravings, and examples of block-work by the Ives method, and by the Meisenbach process, will be found in our present YEAR-BOOK; for perfection and exactness of gradation, there can be no doubt that they far excel the best wood-engravings, although they often lack that artificial vigour and boldness of outline which often characterise the work of the engraver. The production of intaglio printing-plates by photographic means has also made progress during 1884, and we need only refer to our frontispiece to exemplify this; the plate from which the portrait of Mr. Pritchard is printed being made in the establishment of Messrs. Annan, by the method of Klic, and it may be remarked that Messrs. Annan well



deserve the medals that have been awarded to them at the last two exhibitions, by the Photographic Society of Great Britain. Very fine results have also been obtained with the new photo-engraving method of Obernetter, described on page 113 by Dr. Vogel.

Isochromatic or orthochromatic photography has received much attention of late, and the publication by Dr. W. H. Vogel of full working details of his staining method (PHOTOGRAPHIC NEWS 1884, p. 274) served to evoke much discussion in relation to the matter. Dr. Lohse pointed out that by staining a gelatine film with turmeric extract, it becomes practically isochromatic, and Mr. Frederick E. Ives, of Philadelphia, calls attention to the fact that as far back as 1879 he practically realised a good working process of isochromatic photography, the film being stained by means of chlorophyl, and a remarkable illustration of the method will be found opposite to page 112.

Abney has made observations of especial value in relation to the effect of heat in exalting the sensitiveness of gelatino-bromide films, and his experiments in this direction are likely to lead to important results.

Nearly thirty years ago, Professor Piazzi Smyth—accompanied by his wife—erected an observatory on the Peak of Teneriffe; the main object of his expedition being to test the real value of high observing stations, and during the past year Pofessor Smyth's labours have borne fruit. Mr. C. Ray Woods set up the camera on the Riffel and obtained photographs of the corona, even although there was no eclipse; but if this year's observations had been made from the altitude at which Smyth worked, the results would probably have been better. One of Professor Smyth's own photographs of his observing station will be found on page 96.

M. Guyard has suggested that an accurate system of actinometry may perhaps be founded on the fact that iodide of nitrogen is rapidly decomposed by the action of light, and he works with the finely-divided iodide suspended in water; the intensity of the radiant energy being measured by the amount of gaseous nitrogen liberated. As a standard of light for sensitometrical experiments, or making reproductions on highly-sensitive plates, Captain Abney suggests the "Unit lamp" of Hefner Alteneck, as manufactured by Messrs. Seimens Brothers. The lamp is similar to an ordinary spirit lamp, but acetate of amyl is burned, the wick-holder being a tube of $\frac{5}{16}$ths of an inch bore; and when the wick is so adjusted that the flame is precisely 2 6 inches, the light given is equal to that of a standard candle. A plate which registers 24 on Warnerke's sensitometer, when placed behind an ordinary dense negative and at a distance of two feet from the flame, requires an exposure of about one minute in order to yield a good image.

The specimen of Ives' photo-block method, which faces page 113, deserves especial notice, as it fairly represents the degree of perfection now arrived at, and it is undoubtedly superior to the print issued with the YEAR-BOOK last year. The subject is an exceptionally difficult one, and one that would have very severely taxed the resources and skill of the wood-engraver.

Guides to Practice—By Various Contributors.

ON IODIDE IN GELATINE EMULSIONS, AND DEAR DEVELOPERS.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.

THIS is a well-worn theme, no doubt. In the same way that one single advertisement is rarely of use in pushing an article of commerce, so is it necessary to bring repeatedly before the public anything that is really of value, in order to gain for it a recognition. For this reason I write about iodide in emulsions, being convinced that it is *the* thing to give a negative all the qualities that are essential for it to be pronounced first-class. Four or five years' experience with it has fully convinced me that what I wrote regarding it in the first instance is correct in the main, and I am surprised that more people who make their own plates do not adopt it. The one great advantage in it is that the latitude of exposure gained by its introduction is something marvellous. A plate that has been exposed six times more than necessary can be made by proper development to yield a negative which bears no signs of undue lighting. The landscape distances which, on a bromide plate, would fade into the sky if the foreground is properly exposed, can be rendered with their natural force, and there is a delicacy of detail in high lights and shadows which even in a wet plate would be wanting.

Originally, I used about $\frac{1}{12}$ of iodide to bromide of silver, but I have reduced the amount to about half that amount, not through any failure of the former quantity to give gradation, but to make the negatives quicker printers than formerly. Many used to complain that iodo-bromide negatives lacked density when much iodide was used; my complaint was just the reverse. Again, other people complain that fixing takes long. Well, I would remind them that as much depends upon themselves as on the plate. If the hyposulphite be too strong, fixing is slow; and if it be too weak, the same result occurs. Even supposing fixing does take longer, surely, for the sake of a better negative, the extra time is well spent, seeing that it is the hyposulphite that fixes, not the operator. Suppose, for instance, an iodo-bromide plate takes twice as long to fix as a bromide plate, all that is necessary to do is to double the fixing baths. We really seem coming to this, that many photographers are becoming daily more enraptured with mechanical work, and no doubt some would hail the day when their sole occupation would be to keep their books, and turn out photographs, print and all, do their posing and attract sitters, by winding up a handle of a machine at the beginning of the day. The extra trouble of preparing a second fixing bath is evidently almost too much for many now.

Then, again, in the matter of developer we are often reminded that this or that developer is not used because it is more expensive.

Economy is all very well when properly carried out, but it is false economy to sacrifice a small fraction of a penny per negative if the result is better, and this I unhesitatingly say is done by many. Competition may be, and no doubt is, keen, but it only is felt acutely when all work is a dead level. Let one man show that his work is above that of the ruck, and he has no need to fear it. The outlay of a small sum per negative may help him to it. For instance, the ferrous oxalate developer is undeniably dearer than the alkaline pyrogallol, and yet our continental brethren use the former almost without exception. They have found its value. Again, hydrokinone with carbonate of potash as a developer is dear, but then I am under the impression that it is a better one than the alkaline pyrogallol.

HOW TO TEST A LENS.

BY J. VINCENT ELSDEN, B.SC. (LOND.), F.C.S.

To be thoroughly successful in photography it is of the utmost importance that the operator should be perfectly familiar with the lens he is working with. I propose, therefore, to point out briefly how a lens should be examined and tested for any serious defects, as well as for the determination of its capabilities. Small air-bubbles, spots, or scratches on the glass, are of but little consequence, although scratches should be filled up with black varnish to prevent diffusion of light. It is important, however, that the glass should be highly polished, in order to secure brilliancy in the picture and freedom from irregular reflection.

To Find the Focal Length.—Focus a distant object on the ground-glass. Now focus another object so near that the image is as large as nature. The difference between the two positions is the focal length of the lens. To find the optical centre of a combination of lenses, Abney recommends the following plan. Place two rods (ten yards apart) at a spot exactly fifty yards from the front of the camera, which must be perfectly level, and in a line with one of the rods, and at right angles to the line joining the two rods. Now focus the nearest rod accurately on to a pencil line drawn in the centre of the ground-glass. Then the equivalent focal length =

$$\frac{\text{Distance of ground-glass from nearest rod} \times \text{apparent distance apart of rods on ground-glass.}}{\text{Actual distance of rods apart} + \text{their distance apart on glass.}}$$

The equivalent focal length measured from the ground-glass along the axis of the lens will give the *optical centre.*

To Test for Distortion.—Rule a square on a piece of paper and place it at a distance of not less than five times the focal length of the lens. Examine the amount of curvature of the lines on the ground-glass.

To Test for Astigmatism.—Rule a piece of paper, with both horizontal and vertical lines, and focus it on to the ground-glass, so that the image falls near the margin. Either one or the other system of lines will be indistinct. Closely connected with this defect is *spherical aberration*, which causes general blurring of the whole image, and *curvature of the field*, which causes marginal blurring when the centre is in focus, and *vice versa*. These defects, due to the spherical forms of lenses, are more or less present always, but may be diminished by using smaller stops.

Depth of Focus depends on the size of the angle made by the rays, and therefore increases as the aperture diminishes, and also as the distance of the object increases. When used for pictures $\frac{1}{20}$ natural size the depth of focus is 400 times greater than when used for pictures the size of nature.

Angle of View.—Take the equivalent focal length and measure the greatest breadth of the picture, or of the circle of light, on the ground glass. Transfer the latter length on to a sheet of paper, and from the middle of the line so obtained erect a perpendicular equal to the focal length. Join the ends of the base with the summit of the perpendicular, and the angle so formed is the angle of view.

Size of Plate Covered.—This is any rectangle having for its diagonal the diameter of the circle of light on the ground-glass. For near objects a smaller size will be sharply covered than for distant objects.

Chromatic Aberration.—To determine whether the optical and chemical foci coincide a focimeter is necessary. This may be roughly constructed by pasting strips of thick paper, so as to form a series of steps. Now number each step, and focus accurately on to the central one. On development, if any other number is more distinct than the central one, a chemical focus is present.

Flare-spots.—This is a circular patch of light appearing on the ground-glass, in a line with the axis of the lens. It is owing to the image of the diaphragm coinciding with the focal distance of the lens, and may be remedied by altering the position of the diaphragm.

Brilliancy of the Image.—If f F are the focal lengths of two lenses, and a A their apertures, their illumination varies as

$$\frac{f^2}{a^2} : \frac{F^2}{A^2}$$

Thus it is important to estimate correctly the effective aperture of a lens. This may be done accurately thus:—Focus any distant object on to the ground-glass, which is then removed and an opaque board, with a small hole in the centre, substituted. A lamp is now put behind this hole, and a piece of transparent paper is placed over the front of the lens. The diameter of the bright spot on the paper is the effective aperture for that particular diaphragm. The time of exposure varies inversely as the fractions

$$\frac{f^2}{a^2}, \frac{F^2}{A^2}$$

but it must be remembered that the nature of the glass will also influence the quantity of light admitted by a lens.

PHOTOGRAPHY AT THE KEW OBSERVATORY.

BY G. M. WHIPPLE, B.SC., F.R.A.S., SUPERINTENDENT.

In last year's volume I gave a note on the use of the argentic gelatino-bromide paper at the Kew Observatory. Since that was written, the paper has been exclusively employed, and the results have proved in no way less satisfactory. The experiments made with reference to the behaviour of the paper in tropical climates have turned out well, and sheets which we sent to Java have developed as well on their return here as those retained at home. The paper is therefore now being employed in several observatories in hot countries.

One curious fact observed with regard to the A. G.-B. paper may be worth noting.

The lenses of the Kew magnetographs were constructed in 1857, so as to be achromatic for actinic rays. However, on using Morgan and Kidd's sensitive paper, a slight blurring of the luminous dots, which produce the record, spoiled the sharpness of the curves, and no amount of re-focussing or diminution of the light would get rid of the penumbra on the photographic trace.

Endeavours were made to remove the defect by placing a faint yellow glass in front of the gas-burner. Although this scarcely diminished the brilliancy of the light dots on the paper to the eye, their photographic effect was all but completely destroyed. Going then to the other end of the spectrum, a blue glass was substituted for the yellow, with the apparent effect of extinguishing the dots. The cylinders were, however, started, and when in due time the curves were developed, the traces were found to be perfectly sharp and well defined, all the fuzziness having disappeared. The blue glass has, of course, been permanently retained *in situ*..

THE LIMITATIONS OF PHOTOGRAPHY.

BY H. P. ROBINSON.

It is a distinct gain to know what you can do and what you cannot do, just as it is a step to progress to discover error. It is said the patient is half cured when the doctor knows what is the matter. It may be of some service, therefore, to consider where the photographer, in some cases, ought to, or in others must, stop.

At a first glance it may be supposed that the subjects of the photographer could have no limit. The range of the art is from the infinitely little to the infinitely remote; from the most minute microscopic atom to the nebulæ in unimaginable space—nay, it has gone beyond the microscopic, and depicted the invisible. Shakespere "exhausted worlds, and then imagined new;" but even his vast realms were not wider than those open to the camera, for the photographer claims the whole universe of fact, and calls for recognition in the regions of the imagination. The unthinking goose-quill of the poet was no more, in itself, able to write than the unthinking camera of the photographer is to make pictures, but both are mighty instruments in the hands of mighty men. Literature has had all the ages to produce one Shakespere ; photography has not had half-a-century to produce its poet.

The photographer, then, for subjects, has "all the world before him where to choose," but there are a few of them which it would be better if he never touched. The limitations are few but important, and they include some themes that have been the life of art as illustrated in painting and sculpture. I need not allude to the nude—that is admitted on all hands to be unsuited for exhibitions when rendered by the camera, however fitted, as it is undoubtedly fitted, for the painter and sculptor ; but the most important limitation I would make, and it is one that robs us of a number of good subjects, would exclude all those that owe their origin to painful emotion. There are some incidents in life which are too sacred, when real, to admit of the prying eye of the camera being turned upon them ; and if these scenes are imitated, there is a feeling that such incidents should not be travestied. The *Times* critic, in his notice of the last exhibition, has admirably expressed what I mean when alluding to genre pictures. He says : "When, however, he goes beyond this (simple rustic subjects), and attempts the pourtrayal of strong feeling, as in an admirably composed picture of a country churchyard, where a girl has thrown herself on a grave in a passion of grief, hiding her face in her sister's lap, the very realness of the scene suggests unreality and simulation, because the author of the picture has not the painter's privilege of presenting such an incident as imagined, and the mind revolts from the supposition that the camera could be turned in cold blood on a scene of such distress."

Those whose memory carries them back five-and-twenty years may perhaps say that I myself have transgressed in this very matter that I am now censuring. I might plead that it was a long time ago, and that I have had time to change my mind ; I might even quote Emerson to the effect that "consistency is the hobgoblin of little minds ;" but the truth is, that I produced the picture of the consumptive girl well-knowing that the subject ought to have been avoided. It must be remembered that in those days strong measures were necessary. Art at that time was afraid of photography, and artists were always shouting what a mechanical thing it was, what a dull recorder of uninteresting facts, what a "servant of servants," good for use, but not for name and fame. The art-press, wilfully mistaking the instrument for the man, was always asserting that a photograph could have no influence on the feelings and the emotions ; it was as the barrel-organ is to music, and had no soul. It was necessary for the young art to be violently assertive. "Fading Away" was intended to harrow the feelings, and did what was intended, but the time is past when our art should be offensively pathetic.

Notwithstanding what I have just written, I would not exclude the pathetic ; by doing so we should lose many fine subjects without sufficient cause. There are many incidents full of true pathos which are not painful; these I would encourage the photographer to cultivate. Such subjects enable him to put tender thought and feeling into his work, and so raise his art out of the realm of literal fact, and give it a place in the world of imagination.

Historical subjects I would bar. Everything that is impossible should be prohibited to the camera. Queen Anne is dead, therefore you cannot photograph Queen Anne. The painter may imagine that august ruler, or copy her lineaments from authentic pictures; but the photographer cannot work without a model, and he cannot have Queen Anne, and the folly of calling anybody else by that name need not be dwelt on.

The photographer should be guided in his choice of subject first, by the consideration, is it in good taste? Secondly, is it possible? and be satisfied that "what's impossible, can't be."

THE CARBONATE DEVELOPER.

BY FRANCIS COBB, F.R.A.S.

The result of a series of experiments has tended to show that in order to obtain the best work, pure chemicals must be used, and that when sal-soda, washing soda, soda ash, or any other of the commercial carbonates consumed by the ton by bleachers, dyers, &c., are used in the constitution of a photographic developer, the chances are very much against so satisfactory a result being obtained as if the materials used had been chemically pure.

In connection with all the carbonate developers—whether of ammonia, potash, or soda—the sulphite of soda forms an important ingredient; but not only must the sulphite be pure, but it must be kept so, and prevented from changing into the sulphate, which it will readily do under favourable conditions. The stopper of a glass jar left out inadvertently for forty-eight hours during warm, damp weather, sufficed to make the contents of the jar unfit for experimental purposes, the upper surface having become nearly entirely sulphate of soda.

When all the chemicals are pure, the carbonate developer appears to work well and give good density, provided always that the exposure has been full, or rather more than would be required for the ordinary developer; but it cannot be said that for instantaneous or under-exposed plates the same satisfaction is derived from the development by carbonates, that is from that of ammonia; in fact, in nearly all cases of drop-shutter exposure I have had to add ammonia to the developer in order to force out the details.

The combination of the different carbonates of soda, ammonia, or potash with each other appears to work advantageously, and no doubt certain proportions may be discovered that would beneficially affect the developer, and make it available in the many large establishments where persons have to stand day after day inhaling the fumes of the ammonia, which they can only do at considerable personal risk; and in such cases there is no doubt but that the carbonates might be advantageously substituted for the ammonia.

The exposure of studio pictures can be calculated to a nicety, and the action of the carbonates might form part of that calculation so as to provide for the known peculiarities of the developer. As to the amateur who perhaps once or twice a year has a batch of forty or fifty negatives to develop, at such times, and in such quantities at a time, as may best suit his own convenience, and at other times rarely average above half-a-dozen negatives per week, should he entertain any fears of the action of the deleterious fumes of ammonia upon the delicate mucous membranes of his bronchials—let him stick one of Col. Ross' pipes in his mouth, and the narcotic effects of the sublime weed will neutralize the abnormal excitement caused by the ammoniacal fumes.

The action of the latter, in the confined close air of the dark-room, is so injurious to constant workers, that a developer which will do its work equally well for studio exposures, should be welcomed as a means of alleviating the deleterious effects of the present almost universal method.

In conclusion, I must say that while I have obtained no results from the carbonates and sulphurous acid, which I could not equally well have obtained with the ammonia and bromides, I have results from the ammonia process on drop-shutter exposures, which I have never been able to obtain as well by any combination of the carbonates, unless they were assisted by one or more drops of ammonia.

AN AMUSEMENT FOR WINTER EVENINGS.

BY WALTER B. WOODBURY.

It may be remembered that some time ago I wrote a short article on evanescent photography, in which luminous paint was made use of in connection with a positive transparency. I have found the results obtained give a great deal of amusement when parties of friends are assembled.

All that is required is a sheet of paper, or preferably card, such as is sold by the patentees of the luminous paint, and a transparent positive made by any of the known processes—carbon, gelatino-chloride or bromide, collodion, &c. This should be held in close contact with the sensitive sheet, and held for five minutes or so before a strong light—a paraffin lamp or gas jet will give a fair image, but an inch or two of magnesium wire will answer better. The image will remain for some time, but if the luminous surface should be required to be used again for another positive within a few minutes, it can be deprived of its light,* but as these luminous sheets are now to be had at a cheap rate, three or four could be kept in hand.

The curious results of making Galton combination portraits can be shown easily, and will produce much amusement. This must not be confounded with the other method I suggested of backing the positive with the luminous material, which is also a very interesting experiment. If this "science toy" application of photography were more generally known, a little extra business (in making the positives from their clients' negatives) would likely accrue to the professional.

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* This is effected by placing a sheet of green or ruby glass over the luminous surface, and exposing to a strong light.

THREE LEGS.

BY G. F. WILLIAMS.

I PROBABLY express the sentiments of nine-tenths of photographers, when I say that the tripod stand is one of the greatest inconveniences we have to deal with in out-of-door operations. No matter what the form—whether folding, sliding, telescopic, or yet of the alpine-stock principle—I venture to say that most people look upon the "legs" as a nuisance. I have tried every fashion by turns. Many are the views I have passed by and left behind rather than "unlimber" just to expose *one* plate! At any time I consider it more bother and a greater waste of time to erect the tripod and find a secure position for it, than I do all the other part of the performance of fixing the camera, inserting or changing the lens, focussing, and even altering my position and exposing a plate; for *then* comes the almost agony of *undoing* the tripod and making it portable again.

Undoubtedly the straight, rigid, alpine-stock form is the easiest to erect and to re-pack, and if it is devoid of struts, all the better; but just let a man with one of these weapons enter a crowded compartment of a railway carriage, or an omnibus, and glance at the expressions of countenance of the other passengers! The thing won't go on the seat, or under the seat; it sticks into somebody's toes, or hits someone in the eye; it can't be got into the overhead network, because, in all probability, there is no network to put it in; and so, if one could but read the owner's thoughts, he wishes he had a saw to cut the awkward thing in two!

Of folding and sliding tripods, we have innumerable patterns, all more or less heavy, generally rather complicated, frequently addicted to pinching the fingers into blood blisters, often given to one leg suddenly sliding when not wanted, and, worse than all, by no means free from tremor, not to say downright visible vibration. I do not hesitate to say that more than one of the so-called "portable stands" now vended to the public are utterly useless. A gate post, a brick wall, or no stand at all, would be preferable, because then the photographer would be compelled to seek a suitable resting place for his camera, and would probably find one. *Necessity is the mother of invention.*

A friend of mine, who is quite a genius in the way of tripods, showed me one he had made which folded *twice*—most tripods only fold once—and I am bound to say he had obtained rigidity, with freedom from tremor, and kept the weight down in a way that surprised me. Latterly he wrote to say he had produced one which folded *three times*, his object being to get the tripod into the same case as the camera. Need I say that in either case the work would have to be exceedingly good? But probably many would demur to pay, say, a couple of pounds for such an apparently simple piece of apparatus as a tripod. I have paid well on for that sum for a thing, a fad, which I have not used a dozen times, and then discarded.

The rapid improvements in every form of apparatus have scarcely been applied to tripods. What we want is lightness combined with easy and rapid means of fixing and repacking, rigidity when "set," together with freedom from tremor; and especially do we look for some combination of the ring or triangle incorporated into the legs, so as to avoid loose pieces. One rather catches at the idea of a tripod which will go into a space, say, 14 or 15 inches long; there are many advantages from such an arrangement. The unmistakable "cut" of the photographer arises from the fact that the tripod generally betrays him; no matter how the camera, &c., may be disguised in a "brief bag" or "Gladstone," the usually bright coloured stand with smart straps and buckles are significant. Why do people "eye" a tripod as though it were a loaded rifle? A man who carries a cricket bag or a tennis bat escapes observation or remark; but the man with a tripod runs the risk of some busybody asking him if he is going fishing or sketching, if, indeed, he be not asked if he "takes likenesses."

A BATCH OF PRINTS THIRTY YEARS OLD.

BY VALENTINE BLANCHARD.

SOME time ago I spent a most delightful evening with one of the fathers of photography—a member of the first council of the Photographic Society, and a most distinguished calotypist. He showed me a large number of paper negatives and an album of prints; the paper negatives were technically perfect, but the prints from them were an immense surprise for me. My host was an artist, and naturally, therefore, the subjects were well chosen, both for composition and light and shade. The paper negatives gave a breadth and force in the prints which made them very unlike the work of the present day, but, withal, most artistic. But the surprise was not for all these qualities in the work laid before me. It was, that in the whole of a large series of prints there was no evidence of fading. I expressed my astonishment, and asked his secret. He accounted for the permanence as follows. Every print was washed on a glass plate with a sponge, abundance of water being used, and the absorbing quality of the sponge was employed to the fullest extent. Each print was allowed to nearly dry, and then the washing operation was again and again repeated until my friend was satisfied that every trace of hypo was extracted. A *sel d'or* toning bath was in operation, and each print was fixed in a fresh bath of hypo. Doubtless this method of working had much to do with the permanent results laid before me.

ON SETTING GELATINE PLATES.

BY A. L. HENDERSON.

I HOPE your readers will not think me egotistical when I say that very few plate makers have any idea of the difference of quality obtainable from plates set at various temperatures. Now, for argument sake, we will suppose that we have two gallons of emulsion, and we commence to coat in the morning, and that the plates take five minutes to set, and towards the middle of the day the temperature of the coating room has risen ten degrees, the plates necessarily will take longer to set, and this is what is likely to occur (in a very rapid emulsion more especially): the coarse bromide of silver, being heavier, sinks towards the glass, and when exposure takes place, the resulting negative is very thin and poor. Now, if the same plate is exposed through the glass, not only will the plate be more sensitive, but a pluckier negative will be obtained (no allowance being made for the loss of light by the rays having to pass through the glass).

Neither of the above-named plates will be so good as a plate set in one minute. I have had a curious example of frilling, and it came about in consequence of a long setting. After the negative was fixed, I removed the frilling gelatine from the plate, when a faint image remained on the glass, which was easily removed by friction after drying, showing that the silver bromide loosened the gelatine from the glass, although the same plate, quickly set, gave no indications of frilling. I have to give credit to Mr. Prestwich for the hint that the subsidence of the bromide might have something to do with frilling.

I could write a great deal more on the advantage of quick setting, but I dare say your pages will be filled with equally valuable matter, and I think I have shown one reason at least why no two persons can get the same result by using the same formulæ.

REMOVING DEVELOPER STAINS FROM THE HANDS.

BY CECIL V. SHADBOLT.

ALTHOUGH the time when photography was justly termed the "black art" has now happily passed and gone, thanks to the introduction of emulsions, it cannot be denied that even under the new era the hands of the operator frequently bear testimony to the fact that the employment of the alkaline developer is not altogether as clean a job as might be wished.

Often, after developing and fixing a batch of plates, have I found my fingers covered with stains which the combined energies of the scrubbing brush and pumice stone have not always been successful in eliminating; but it has only been during the past season that I have discovered a method of getting rid of these stains, so simple in itself that my only wonder has been the fact of my not finding it out sooner; and I can only suppose that the means in question must be perfectly well known to many photographers, though I do not remember ever having seen it previously advocated. At the same time it is possible that there may be some who have experienced the same difficulty as myself without having hit upon the remedy which I now give for the benefit of those to whom it may not have occurred. It is merely to rub the fingers well with the ordinary alum solution used for clearing negatives, when, in the space of a few seconds only, the stains will vanish as if by magic.

The following is an excellent formula, being that recommended by Mr. Edwards for the clearing of gelatino-chloride plates :—

Alum	1 ounce
Sulphuric acid	1 ,,
Water	20 ounces

ON SODIUM SULPHITE.

BY WILLIAM LANG, JUN.

As sodium sulphite has already become to a very large extent a necessary chemical of the photographers, a few words regarding its constitution may be acceptable to the readers of the YEAR-BOOK. When a solution of sodium carbonate is saturated with sulphur dioxide (sulphurous acid gas), the product of the reaction is the acid sodium sulphite (formerly bisulphite of soda). By adding the same quantity of sodium carbonate as what was decomposed in the first instance, the normal salt, the salt we are now considering, is obtained. Its chemical formula is $Na_2SO_3+10H_2O$, and it is a salt with a decidedly alkaline reaction. A saturated solution contains about twenty-five per cent. of the crystals. In solution it is by no means stable, oxidising more or less quickly to the more permanent sodium sulphate. Many of the discrepancies found by those using sodium sulphite are no doubt due to this fact. With a salt which oxidises so readily in solution as sodium sulphite, fresh solutions are indispensable in order to obtain uniform results. The fact that sodium sulphite along with pyro, and without the presence of an alkali, is capable of developing the latent image, is of great interest. It does away with the idea that this salt, as alleged, is a retarder of development.

In Mr. H. B. Berkeley's original formula, where sulphite is employed, citric acid is added till the solution of the sulphite shows a slightly acid reaction. That the slowing of the development was due to the citrate of soda thus formed there can hardly be a doubt; but it was the sulphite that got the credit—or, rather, discredit—of being the retarder. Bromides should also be dispensed with in developing formulæ where the sulphite is used, as their restraining powers seemed to be greatly increased. How this should be so it is difficult to see, but direct experiments have proved that such is the case.

In connection with mercurial intensification, sodium sulphite promises to play an important part. A ten per cent. solution of this salt, applied to the image which has been bleached in the usual way by means of mercuric chloride, blackens and intensifies the image in quite as effectual a manner as the ammonia hitherto used for this purpose. There is, however, this difference in favour of the sulphite, that the film does not become stained, even although the whole of the mercuric chloride may not have been eliminated by washing. Readers are recommended to make a trial for themselves of this new modification of mercurial intensifiers.

THE POTASH DEVELOPER.

BY I. H. JENNINGS.

Last summer, having to abandon my old well-tried developer, pyro and ammonia, I was advised to try the virtues of soda, which in many hands has proved very satisfactory. I had already tried ferrous oxalate, and while I appreciated its cleanliness, and the bright delicate negatives it produced, I yet found it wanting in several important qualities, so I went in for soda. On making up the developer according to a well-known formula, I proceeded to develop some plates that had received "instantaneous" exposure. The image on the first one appeared very slowly, and seemed to hang back, so I applied some more soda to try to force it out. This I found of little avail, and the negative appeared to become misty, although I had used bromide in making up the formula. Well, I got disgusted, washed the plate well, and applied my old friend pyro and ammonia. This brought out the image pretty dense, and I felt satisfied; so, after a good wash, the plate was put in the hypo bath. When it was fixed, I took it out in the light to examine. Horror!—no—what a triumph! a photograph in colours! Well, perhaps not exactly natural colours, but still, genuine colours—a little child with a pink pinafore over a blue dress, whereas he had been dressed in a tawny-coloured fabric; the face, too, had a decidedly pink tinge.

I pursued my discovery no further. Ruthlessly I scraped off the coloured film with an old negative, and went to try the other plates. Still, fortune did not favour my efforts. I got no colours now, but spots, stains, and patches appeared on every plate, to my horror, for I prided myself on being a clean worker. Explain it I could not, so laying all the blame on my tools, I forthwith poured the wretched soda solution down the sink. Further experience with soda gave me better results, but I did not feel satisfied, and I have always disliked washing soda—it is such a vulgar alkali!

Acting on the advice of the Editor, who is always ready to help a puzzled amateur in difficulties, I resolved to try potash. Which formula should it be? A very excellent one, used by Mr. Beach, was published in the Photographic News, August 1, 1884, page 385, and this formula, with such modifications as necessity dictates, I adopted and still use. To me it gives complete satisfaction, and I have more than once demonstrated its good qualities to advocates of other developers, who have been loud in their praises of the beautiful negatives produced by its means.

However, from some cause or other, it has not proved successful in some hands. Complaints of frilling and want of density have been made against it, and were these complaints well-founded, they would form serious objections to the potash developer.

As to its frilling qualities, I only once found plates frill after development with potash, and these plates showed a tendency to frill under other modes of treatment; yet even they were cured by immersion in chrome alum immediately after development. Plates by the leading makers did not frill, even when alum was not used, although, as every photographer knows, all plates are somewhat liable to this defect in such hot weather as we had last August.

The second complaint, want of density, I can hardly explain, unless impure chemicals were used in mixing the developer, or too long exposure was given to the plates. The latter supposition is the more probable of the two, for I have found that the potash developer requires much less exposure than ammoniacal pyro. Over-exposed plates can be made sufficiently dense with potash, or even unduly so, as one or two negatives I still possess certainly show; but anyone trying potash for the first time would probably find his over-exposed plates come out too thin.

Theoretically, the potash developer should be capable of producing any amount of density; for with this form of developer the pyrogallic acid does not oxidise so rapidly as when ammonia is used, but remains perfectly clear for a very long time. In fact, after the used developer has been left standing in a glass exposed to the air for more than an hour, no trace of turbidity was visible, and with the same solution I have successfully developed a plate for experiment sake. My experience is, that with a moderately dilute solution it is possible to go on developing a properly-exposed plate until pitchy blackness is gained in the high-lights, and greater density than absolute opacity no one can ever require.

One day a friend brought me a new Voightländer euryscope of ten inches focus, to try the merits of both lens and potash developer. The experiments were made in a back-garden facing the north, about 4 p.m., and in the shadow of the house. One of us sat for a portrait, and the lens was used full aperture. My friend uncapped the lens, and gave an exposure of about half a second. This I knew to be too long, so I told him to try again, and give a shorter exposure. Next time it was "cap off and on" as quickly as the hand could move. Two plates were given this rapid exposure, and we then adjourned to the dark-room to develop. For developing the first plate a minimum of potash was used; but the image appeared too quickly, and the developer had to be diluted. All then went on well, and development was finished in about ten minutes. On taking the negative into daylight, it was found to be delicate, but dense enough to print well. The other two plates that had received less exposure came out slowly at first, but afterwards rapidly grew in density. However, as I wished to show my friend the qualities of the new developer, I allowed them to remain in the solution until the high-lights, by the developing lamp, appeared really opaque. Long before this, the image had come out strongly on the back of the plate, showing how unnecessarily far I had carried the development.

Next day, the thin negative gave a print of good quality; but the other two, it is needless to say, gave disagreeably hard pictures, which, spite of the clear colour of the negatives, took a very long time to print.

On another occasion, we took two portraits in a garden, in the angle formed by two walls of the house, northern aspect, about twelve o'clock at noon. We used a rapid French euryscope lens, No. 3 stop, and exposed for less than a second. Both plates were successful, giving good, vigorous negatives in about five to seven minutes.

A few days after, we determined to give the developer a severer trial, so we again exposed two plates, about six p.m., on a dull, cloudy evening, in the same nook formed by the two walls. This time we used an orthoscopic lens of fifteen inches focus, by Voightländer, and a sixteen-inch single meniscus, of very old make. The orthoscope was used full aperture, and the single lens with $\frac{f}{20}$ stop. The background was formed by hanging crimson curtains to the north wall. We gave an exposure of five seconds with both lenses, as the image on the screen was most decidedly "dark." My friend offered to bet that no image would appear on either plate, as the lenses were of the slowest type, and the evening was very dull. However, he lost, for I felt confident that the potash would come up to my expectations. Nor was I deceived, for, on developing with the normal strength of solution, the picture taken with the single lens was found to be fully exposed; while that taken with the Voightländer orthoscope was somewhat over-done—three seconds would have been ample—but diluting the developer set matters right. We got two negatives of good density, and full of detail from edge to edge, in spite of the bad light and the slowness of the long-focus lenses.

We next proceeded to develop two of Marion's plates, which my friend had exposed by the river-side earlier in the day. He said he had given an exposure of two seconds with Voightländer's new rapid doublet of ten inches focus. This I knew to be a case of tremendous over-exposure, so I added more water *to the same solution with which I had developed the two preceding plates*, and set to work. No image appeared for about a minute, but then it appeared slowly, and grew in density. After about ten minutes, on holding up the plate before the lamp, both detail and density appeared satisfactory, and the other plate was developed in the same solution. Both turned out brilliant negatives, and printed well.

Now, in the case of these four plates, I think the ordinary pyro and ammonia mixture would have failed, or not produced satisfactory negatives; yet the potash, simply by being used in different degrees of concentration, fully answered what was required of it, bringing out what would usually have been under-exposed and over-exposed negatives.

If anyone wants an "elastic" developer that won't fog the most sensitive plate, let him try the potash developer according to Beach's formula.

A POTASH DEVELOPER.

BY REV. B. HOLLAND.

Having tried all, or nearly all, the developers advocated from time to time, pitting one against the other, and comparing the resulting negatives side by side and in the printing-frame, I have been led to the conclusion that the following simple developer is all that is required. Simplicity, I imagine, should be aimed at rather than complication, for every operator is not a scientist, nor is every photographer a thorough chemist. To mix and store this developer, obtain a bottle large enough, and introduce into it 1 pound of carbonate potash, and 16 ounces of water; that is all. One drop, or twenty drops, as the case requires, may be put into the usual pyro and water, and, if judiciously used, a negative of splendid printing quality will result.

TONING SILVER CITRO-CHLORIDE PRINTS AND TRANSPARENT POSITIVES.

BY W. M. ASHMAN.

The probabilities being in favour of an increased use of silver-citro-chloride mixed with gelatine, for the purpose of obtaining positives printed out for enlarging, the lantern, opal, or paper, it may not be considered out of place at this season to say something about the prints so obtained. Not that the ordinary methods of toning paper prints are unsuitable, or that any very especial care need be observed beyond the usual precautions; still, without some definite formulæ for guidance, there is a possibility some difficulty may be experienced in obtaining the colour desired.

The following will be found capable of giving any tone to the transparency or positive by reflected light, ranging between warm brown and purple black:—

Ammonium sulphocyanate	1 drachm
Water	1 pint
Gold terchloride	1 grain

Upon adding the gold, it is converted into a sulphocyanate, which will be seen to have a red colour. The precipitate, however, dissolves in the excess of sulphocyanate, and is then ready for use.

Washing before toning is dependent on the formulæ employed in making the emulsion; in most cases it will be found advisable. Toning action is first seen at the edges, by the colour changing to a yellowish-brown; soon the whole print assumes a sepia tint, then purple, and finally blue-black, the usual time occupied in these changes being less than five minutes. The print should then be transferred to another dish containing a plain solution of ammonic sulphocyanate (2 drachms of the salt in 1 pint of water), where it may remain five or ten minutes, after which it should be placed in weak hypo 1—10 until the soluble chloride is dissolved. Ammonium sulphocyanate alone will be found to fix a plate or paper print made with silver citro-chloride emulsion, but hypo is cheaper and quicker. Should the plates or paper be inclined to frill, place them in saturated chrome alum solution after toning; this in no way affects the colour or purity of the whites. Washing is the same as with other gelatine plates and silver prints.

AZALIN DRY PLATES.

BY ROMAIN TALBOT.

THESE plates, when exposed through a yellow glass, give nearly the true value of all the colours of the spectrum. They are to be recommended for oil-paintings or other coloured objects, because they reduce the retouching of the negative to a large extent. Unlike the eosin plates, the azalin plates have the great advantage of being sensitive to the red tints, and they also reproduce blue and green much more correctly. When azalin dry plates and common dry plates are both exposed at the same time through a yellow glass, the azalin plates are the more sensitive; but both compared in white light, the azalin plates are less sensitive, nearly as half to one-third.

The development, &c., of the azalin plates is exactly the same as for common plates, though it should be remembered that azalin plates will be more affected by red light; in consequence of this, they should be manipulated without direct exposure to the red light, and ought to be developed in a covered tray.

After twenty minutes, the azalin colour will be nearly destroyed by the developer, and the plate can be then exposed to the red light without danger.

The exposure for a water-colour painting in a good light (Steinheil aplanatic lens and dark yellow glass) will be about sixty seconds, and through light yellow glass only thirty to thirty-five seconds; but oil-paintings require a longer exposure.

DOUBLE EXPOSURES.

BY HARRY PLATT.

SOME twelve months or more ago I had occasion to make some instantaneous exposures at the hulk of the old U. S. man-of-war *Worcester*, as she was being towed down Norfolk Harbour, going to her own funeral. It is very seldom that I ever expose more than one plate in the same view, but as this was a rare chance which would never occur again, I made several exposures before she got out of range; but in my haste the holders were slipped back into a satchel which I sling over my shoulder for carrying them in, and got mixed with those containing unexposed plates. I had kept no record of them, consequently could only pick out two or three from memory. It then occurred to me to try an experiment in the way of double exposures, so I took the rest of the plates, and exposed them on various objects, giving to each a somewhat longer exposure than ordinary, and taking them to my dark-room, I developed them for long exposures, and, as a result, got very good negatives on every plate. Thinking perhaps the plates were all good anyway, and that I had not used as many on the *Worcester* as I supposed, I took out another lot, and gave them all snap exposures on different views; then I re-exposed some of them on other subjects, giving quite a long exposure this time. Those which had only the snap exposures were developed as instantaneous plates; while those which had double exposures, I developed as long timed plates. Both gave good negatives, and the double-exposed plates showed no sign of the first exposure. This was followed by one which I varied in this way. From the window I snapped a plate on an animated steeet view; then, cutting it in half, I used one half on a sitter in the skylight, and the result was that in the first half I got a good instantaneous view of the street, and on the other a good full-timed portrait negative, with all the shadows and half-tones necessary for fine work. I now use as many plates as I have time to when doing any choice instantaneous work, and after one develops up good, put the rest by and use them as slow plates; consequently, I am more sure of my snap work without the exposure of several wasted plates.

TRANSPARENCIES BY THE GELATINO-BROMIDE PROCESS.

BY J. B. B. WELLINGTON.

HAVING been very successful in making gelatino-bromide plates, and using them for the purpose of lantern transparencies, I will do my best to describe the process for the benefit of those who, like myself, are now looking through their stock of negatives taken during the summer campaign, to consider which ones will be most suitable for the purpose.

No printing process is able to produce such delicacy of detail as a transparency on glass, and when thrown on to the screen by means of the lantern to life-size, or even larger, it recals far more vivid recollections than a small print would. And what is greater pleasure than to invite a few friends to participate in a winter's evening enjoyment? No wonder that the optical lantern now brought to such perfection, compared with those of bye-gone days, is gaining favour with amateurs; and when the cost and trouble of producing slides is so small, there is no reason why amateurs should not manufacture their own plates for the purpose. The formula I am about to describe is a very economical one, and if a batch of emulsion should be spoilt, it is not a very serious loss; and should a transparency happen to be wrongly exposed, or not quite the tone, it can simply be cleaned off, and the glass used for mounting another one. The quantity of silver on each 3¼ by 3¼ plate amounts to less than half-a-grain.

The gelatino-bromide yields, I think, quite as good results as the chloride, but that is a matter of opinion. The high lights are perfectly pure, and any range of tone from a soft black, through brown, to a beautiful ruby or claret colour, can be secured according to the length of exposure and the amount of restrainer used in the developer. The plates keep well, and, moreover, can be developed with pyro.

The formula I use is as follows:—

Silver nitrate	50 grains
Citric acid	50 ,,
Ammonia ·880	1½ drachms
Water	4½ ounces
Gelatine (Nelson No. 1)	20 grains
Potassium bromide	45 grains
Gelatine	20 ,,
Carbolic acid	5 drops
Water	4½ ounces

Or double the above quantities, keeping the water the same; it gives a denser plate, and is, perhaps, more satisfactory. In my hands both are a success. The silver nitrate and citric acid should be dissolved in the water first, then the ammonia added, when a precipitate of citrate of silver is formed, which should be just re-dissolved by the amount of ammonia given. The gelatine should be added to this just before mixing the silver with the bromide. Both solutions should now be raised to about 140°, and the silver solution poured in a steady stream into the bromide with constant stirring, when a beautiful transparent ruby emulsion is the result. The bulk of gelatine (250 grains Heinrich's) is now added, having been previously swelled in water, and put aside to set; it is then broken up and washed in the usual manner. Finally, half-ounce of alcohol, together with four grains thymol, is added. The above quantity should coat from 100 to 120 3¼ by 3¼ plates. It will be found easier to coat 6½ by 6½ plates, and afterwards to cut them into four.

The exposure behind an ordinary negative, 18 inches from a gas flame, will be found to be about ten seconds, with the normal developer producing a warm black tone, and by increasing the exposure to five minutes or more, and using 60 to 100 minims of the bromide solution, will produce a beautiful pink or claret colour; this latter exposure will take some fifteen or twenty minutes to develop. Any intermediate tone can be had by giving less exposure and less bromide in proportion.

The developer I prefer is one brought out by Mr. B. J. Edwards some time ago, which answers admirably for these plates, and, moreover, is an inexpensive one; it is composed as follows:—

1.—Oxalate potas.	2 ounces
Ammonium chl.	40 grains
Water	20 ounces

2.—Iron sulphate	... ...	4 drachms
Citric acid ...	... ...	2 „
Water ...	... ...	20 ounces
3.—Bromide potas.	... ...	1 ounce
Water ...	... ...	3 ounces

Equal quantities of 1 and 2 are taken, and the quantity of No. 3, according to the exposure and tone required; after fixing, the plate should be well washed, and passed through a weak bath of sulphuric acid and water, which dissolves any oxalate left in the film, and again washed.

By increasing the quantity of silver three or four times in the formula above given, likewise the rest of the formula in proportion, keeping the amount of water the same, a more rapid and opaque plate will result, which is suitable for either landscape or transparency work; and if, after mixing, the free ammonia liberated is neutralized with the same amount of citric acid as was used in the first place to convert the nitrate of silver, and then boiled for about one hour, a splendid quality plate will be the result, showing about 15 on the sensitometer

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A FEW REMARKS ON DEVELOPERS, ETC.

BY A. R. DRESSER.

So many amateurs are now starting, I think my experience may be of use to them. I have now been two years at work trying the different developers put before the public, and think I have struck what is wanted. What I think is wanted, is a developer that will do with any make of plates (that is, if good plates), and I have been experimenting for some time, and now have found two that are all I could wish. One is a pyro ammonia, and the other a pyro potash developer; and I find either work well, but I fancy the pyro potash one myself. The pyro ammonia developer I use is sulph. pyro. gal., made by the Platinotype Company, and with that I use ammonia sol., viz.:—

Ammonia	... ...	1 ounce
Water...	... ...	2 ounces
Bromide	... ...	70 grains

To develop a half-plate, I take 2 ounces water and add 80 drops of sulpho. pyrogal. (every 10 drops of sulpho. pyro. contain 1 grain pyro.) and 6 or 8 drops of ammonia sol. Flood over the plate, and watch till the picture appears. This developer is slow, and takes a minute or so to appear; when the image is well out I add 10 drops more ammonia sol., and keep on till dense enough, which is soon learnt. The potash developer I use is "Beach's" potash developer.

Pyro. Solution.

Water, distilled	... ...	2 ounces
Sulphite soda (pure)	... ...	2 „

Dissolve. When cold add—

Sulphurous acid	2 ounces
Pyro.	½ ounce

Potash Solution.

A.—Water	4 ounces
Carb. potash (pure)	3 ,,
B.—Water	3 ,,
Sulphite of soda (pure)	2 ,,

Combine A and B.

To develop a half-plate, take water 2 ounces, and add pyro. sol. 2 drams, potash sol. 1½ drams, and with this flood the plate. I find this developer a very good one indeed, but I alter the formula a little. I make up two developers, viz., No. 1, 2½ ounces or 3 ounces water, to which I add pyro. sol. 2 drams, potash sol. 1½ drams; No. 2, 2 ounces water with same amount of pyro., and potash sol. as No. 1. To develop an instantaneous picture, I use No. 2 as it is, but for a picture that is given 1″ to 20″, I first use No. 1 till the image appears, and then, when the image is fully out, or nearly so, I pour back No. 1 into the glass, and flood with No. 2 till I get the picture fully out; and I find I get better intensity that way. I have been very successful with this developer, and have got some very good transparencies for the magic lantern with it on ordinary dry plates. I have lately made a lot of lantern slides on Marion's cheap dry plates, and developed with potash and pyro developer, and find them very good, and as good as many on chloride plates.

These two developers are as good as any going, to my fancy, and I find they will do with any make of plates, as I have tried nearly all the leading makers with them, and find all did well.

I find a great deal of amusement from my magic lantern, as I go a trip in the country, and when I come home and have developed my plates, I make transparencies from them. This I do with an enlarging camera, putting my negative against a window, and taking a positive from it the same as a negative,* and develop with potash pyro. sol., and if not dense enough, I intensify with mercury and sulphite of soda (not ammonia), and so far have found none that are so intensified have discoloured as the same will often do with ammonia. The formula for this intensifier will be found in the PHOTOGRAPHIC NEWS of October 17th, 1884. I can now do without any ammonia at all for developing or intensifying, and this will be found of use to many who may suffer from the fumes of ammonia.

You will notice I say with potash pyro. developer when using No. 1 and No. 2. Do not throw sol. away after use. I find I can develop three or four plates with same sol., and get as good results as when new is used; but it must be done at the same time, or nearly so, and not kept for three or four hours.

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* I use ordinary dry plates, but slow ones, and prefer, for magic lantern slides, Marion's cheap quarter-plates

I think I have made this long enough, and only trust some of your readers may find what I have said of use.

STELLAR PHOTOGRAPHY.

BY REV. T. E. ESPIN, B.A., F.R.A.S.

(Special Observer to the Liverpool Astonomical Society).

In October 1883, after seeing the plates obtained by Dr. Gill and Professor Pickering I was led to make some attempts at photographing large fields of stars with a view to determine their actinic magnitude.

The line of research was altogether new, and beset with many difficulties. Nevertheless, the preliminary experiments made with a compound lens of 2½-inch aperture led me to bring the matter before the Liverpool Astronomical Society. The council at once determined to apply for funds for the erection of a proper instrument, and communications were opened with Howard Grubb, Esq., F.R.S., as to the cost of a suitable one. The cost of purchase was hopelessly out of the reach of the funds of so young a society, but Mr. Grubb generously offered to place an instrument at our disposal on loan for a merely nominal sum, the Society paying for alterations necessary in adapting it for stellar photography. This arrived in March at West Kirby, and was at once set up. It consists of an iron equatorial mounting on a massive wooden stand. The camera is of wood, and the lens of four and a-half inches aperture. The camera is driven by clock-work.

Wratten and Wainwright's plates have been found far superior to those of all other makers. Plates of greater rapidity are, however, much to be desired.

During April and May, experiments were made with a view to the preparation of a catalogue of the actinic magnitudes of a zone of stars. The results were published in No. 3 of the Transactions of the Liverpool Society. Here the difficulties and causes of error are discussed, and a catalogue of the magnitudes of five hundred stars are given. The method is to allow the stars to drive so that, instead of coming out as dots, they come out as streaks. These are more easily compared one with another. The actual zone work was commenced in May, but the brightness of the nights soon prevented further work. In the zone work each section is photographed twice, and the plates are taken at least one month apart. Any variation in the stars can thus be detected, and several stars are at present under observation for variation. Besides the zone work, some attention has been given to star clusters and nebulæ. The photographs of many of the clusters are very surprising. The nebulæ are too faint, as a rule, to show very distinctly on the plates. Some of the double stars undergo curious reversals in magnitudes. An orange star which is many times brighter than its blue companion to the eye, on the plate almost disappears; while the small blue companion comes out brighter than any of the surrounding stars. The orange stars mostly fall in magnitude, sometimes as much as two magnitudes. Of course the appearance of a constellation is thus entirely changed on the plate, some stars disappearing, while other stars not visible to the eye appear. As a rule, however, the light is normal, and about two-thirds of the stars when reduced show the same magnitude on the photograph as they present to the unassisted eye.

LIGHT FOR THE DARK-ROOM.

BY W. E. DEBENHAM.

The use of a yellow instead of a ruby light for those photographic operations which require what is called a dark-room, has been spreading considerably during the past year. It is, however, sometimes assumed that although a yellow light may safely be used for developing, a red or ruby-coloured illumination is necessary for the preparation of the plates.

If, however, as many experiments seem to show—notably those of Mr. J. R. Sawyer, described at the June meeting of the Photographic Society of Great Britain—yellow and orange light have less effect upon a sensitive plate in proportion to illuminating power than red light, it is difficult to see how the latter should be safer or better for any part of the work of plate making; and the practice of some of our most advanced workers is to use yellow light alone for all photographic operations. Mr. W. Cobb, whose views of London are amongst the most remarkable instantaneous photographs that have been seen, and who has succeeded in preparing plates of most extraordinary rapidity, recently stated that he used yellow light in his coating room, and found that even a prolonged exposure to its rays had not affected plates which were exposed to it.

Of all the yellow mediums that I have tried, I have found none, when used alone, to give at the same time so strong and safe a light as that which is known as golden fabric. It is so very translucent that several thicknesses may be used, and still sufficient light transmitted for satisfactory working. For my own part, I like to be on the safe side, and, therefore, whatever coloured light I have been using, I employ such a thickness of the medium as to remove all fear of veiling the plate with "golden fabric." Four folds over a small window will be found to afford an ample light; whilst if the sun shine upon the window, extra thicknesses may be applied, and still far more light to work by will be admitted than with the lauded ruby. For artificial light, one, two, or three thicknesses may be used according to the power of the light and the sensitiveness of the plates to be dealt with.

It is obviously desirable with this, as with all textile fabrics, to have a sheet of glass in front, to protect it from splashings; and the outer fold should be examined occasionally, and, if at all faded from exposure to light, changed.

HINTS ON FLOATING ALBUMENIZED PAPER.

BY W. K. BURTON.

To those who sensitize paper on a small scale, and especially to those who, having an experimental tendency, are in the habit of trying various different samples of albumenized paper, it is always somewhat of a question how long to float on the silver bath.

As is very well known, different makes of albumenized paper require different lengths of time on the sensitizing solution. Besides this, the same make of paper may require, to give the best possible results, different lengths of time according to circumstances. For example, in very cold weather the time required may be two or three times longer than in warm weather. Again, a strong bath may—although it appears curious—require the paper to be longer floated than a weak one will. This fact is explained by Abney in the following manner. With a strong bath a thin layer of silver albuminate is formed on the paper almost immediately that this comes in contact with the solution; and, as this layer is almost impermeable to the liquid, a considerable time must elapse before the soluble chloride behind it is reached by the silver nitrate and is decomposed by it.

To put it briefly, there are so many factors going to vary the time required, that a simple experimental method of determining seems a desideratum.

The following is a method which I have used myself. I do not know whether it is in fact original, but I have certainly never seen it published. It may be of little or no use to the systematic worker who uses ream after ream of the same brand of paper; but to myself it has proved a great convenience, and I think it may to others who are fond of experimenting.

The "indicator" which I use depends on the fact that when potassium chromate and silver nitrate come into contact in presence of water, silver chromate is formed, which is of an intensely brilliant red colour. So brilliant is it that a single grain of it will tinge deeply a whole gallon of water. The following experiment will explain in a moment the method of using potassium chromate, to indicate when albumenized paper is thoroughly sensitized.

A solution of potassium chromate, two or three grains to the ounce, is taken—precise strength not important; the solution should have a distinctly yellow colour—and some of this is brushed on to the back of a piece of albumenized paper. When the paper is dry, it is floated in the usual manner on the silver sensitizing bath. If the portion on which the potassium chromate has been brushed be watched, it will be found that after the lapse of a minute or two it begins to change colour—becomes first a deeper yellow, shortly an orange; and if the paper be left long enough on the solution, will eventually turn deep red. The beginning of the change of colour indicates that free silver nitrate has penetrated the albumen, and that presumably the whole of the soluble chloride therein has been converted into silver chloride. I find that the best results are got by continuing the floating till a slight orange tint is reached. In practice, of course, the chromate solution will not be brushed on to the centre of the paper, but on to one corner.

Another little hint may be of use to some. I found it a great nuisance, myself, looking under each sheet after it was laid on the bath for air-bells, and was greatly relieved when I found that it is quite as easy to ascertain the absence or presence of them by looking at the back of the paper as it is raised from the solution, as by looking at the front.

I work by the light of an ordinary paraffin lamp, and keep the sensitizing bath between it and myself. When the paper has been laid on the solution, and has become flat, I lift it by the two corners next the lamp. As this is done, a bright line of light may be seen through the paper at the place where it and the surface of the liquid part company. This light is caused by reflection from the surface of the liquid, which, when it comes in contact with the paper, is caused to assume a curved form. Wherever there is an air-bubble, this is seen quite distinctly by the interruption of the line. In nine cases out of ten the paper may be so laid on to the surface of the liquid again as to cause the bubble to travel to the edge. If this cannot be done, of course the bubble may be broken in the usual manner.

A FEW PRACTICAL HINTS TO AMATEURS.

BY T. G. WHAITE.

To counteract the effect of ammonia fumes in the dark-room, Mr. Freeman recommends the use of snuff—a very good excuse for those who indulge in the use of the titillating powder. I think the adoption of Mr. Marshall Wane's screen for the eyes, as given in a former YEAR-BOOK, will be found to answer much better, inasmuch as it not only (if brought low enough) keeps away the fumes from the eyes and nose, but shades the eyes from the trying light of the window. A simple light stretching frame, such as used by artists for canvas, covered with brown paper, and hinged over the window to reach down to the front of the developing sink, roof-like, is all that is required. Use this simple contrivance once, then always.

Few amateurs, in fitting out, recognize the importance of a substantial camera-stand; even those who determine to spare no expense and get the best of everything, generally fail in their stands from their want of experience and from the want of knowledge on the part of the dealer. After having had at least sixteen different stands for my "tourist" camera, I have secured a form of stand I consider perfection, after using it for three seasons. It is made of bamboo, fish-rod connections, with bayonet joints, thicker at the base than at the top (this is important); it is extremely light, absolutely rigid, and will go into an ordinary portmanteau; it is costly if well made, and well-selected canes, but saves a lot of grumbling and waste of plates.

How is it we never see a spirit-level on our cameras? One about an inch long inserted in the tail-board enables you to see, when focussing, if your camera is level. I have for many years had them in use, and find them indispensable.

Something should be done by the optician in improving the diaphragm or diaphragm slit—something to render it, when the stop is placed in, light-tight; in its present form (especially in the rapid form of lens) it is a constant cause of fogged plates and weak images. Whilst the operator is waiting for the right moment for exposure, either in figure or landscape work, with the slide ready drawn, the light is pouring in at the diaphragm slit, and causing fogged plates. Until we get something better, a couple of india-rubber bands, one on each side of the diaphragm, will choke out the light.

We often see in a beginner's pictures (and many old hands' too) a great amount of uninteresting foreground, which might have been avoided, or rather condensed, by slightly altering the height of the camera. The artist (painter) generally makes his sketch sitting on a low camp-stool. If we were to lower our cameras occasionally to the height of his eyes, we should avoid a great deal of the blankness of our foregrounds.

I was asked once at the late Exhibition, how I managed in my figure subjects to prevent some of the figures staring in the lens? How in the market scenes no one seemed conscious of being taken? Well, it is done by "dodging"—dodges of all sorts. One most useful is to attach your spare lens (most photographers carry two) to the side of your camera. You can then with this lens well exhibited, and with a little show of work, attract the usual inspectors of the lens quite out of the range of the working lens, which may be almost concealed by the black cloth. One eye can be kept on the subject desired, whilst you keep the undesirable subjects steady under the impression that they are being taken. It is very easy to deceive them in this way, and to work both lenses after a little practice. Those who only carry one lens will find it worth the trouble to attach a piece of brass tube and a cap to the side to imitate one.

If you have six double slides to carry about with you most of a day whilst hunting up subjects, in addition to camera and stand, it will be found a great convenience to have a couple of game-keeper's pockets made inside your coat; the weight, being so well distributed, is hardly felt, besides being so handy to get at and expose, and replace, keeping them out of the sun, and preventing the risk of leaving one in the grass.

Secure the camera screw with a small chain to triangle top.

GELATINE *VERSUS* ALBUMEN PRINTING PAPER.

BY G. S. PENNY.

How is it that improvements in printing do not keep pace with the rapid advance in negative processes? It is true we have printing in pigment, which comparatively few photographers make use of for ordinary work. The platinotype, though possessing the valuable quality of permanence, seems not to make much advance in public favour. The specimens, as seen on exhibition walls, commend themselves to the eye of the artist for their freedom from the vulgar glaze of albumen, and from their resemblance to engravings, which in my humble opinion consists only in their black tone. Being printed from specially selected suitable negatives, the amateur who essays to follow the lead of some successful exhibitor finds the result unsatisfactory with a large majority of his negatives; so he has no alternative but again to fall back upon albumen paper, much as he may deem the gloss meretricious and inartistic.

There must be others besides myself who feel a want of some intermediate process of a kind as simple and certain as that in daily use. It seems to me that gelatine, which has now come into use as the medium for printing upon by development, would give "the happy medium" desired if it were substituted for albumen in the ordinary printing process.

As much as ten years ago I made some experiments in this direction, and the best results obtained were by chloride of silver in gelatine treated with chrome alum, upon lac-transfer paper, as prepared at that time by the Autotype Company. This kept the image upon the surface; it yielded all the range of colours from red to black, that we get with albumen paper, the mode of toning and fixing being the same.

As to its permanence, my samples, kept for ten years or more, show no change. It had but one drawback, namely, that of printing slowly. This, in these go-a-head days, may be considered an objection, but one that can, I imagine, be readily removed, as has been the case with albumenized paper. This is a matter for those who supply the market. We amateurs have often to content ourselves with figuring as pioneers of progress by suggesting improvements; it is for the enterprising ones in the trade to take them up and introduce them to the notice of practical photographers.

A CHEAP "INSTANTANEOUS SHUTTER" FOR TIMED EXPOSURES.

BY H. CHAPMAN JONES.

THE necessity for carefully regulating the exposure according to the subject and the illumination is at once admitted in connection with ordinary photographic work. Whatever is true in counting by seconds must also be true in counting by hundredths of a second; though there are many amateurs who are careful in the one case, and leave the other to a luck which sometimes favours, but more often fails. And so instantaneous photography is to such operators uncertain and perplexing, except when it is confined to the same sort of views in fairly uniform weather.

It is, of course, as easy to calculate the exposure required for instantaneous as for other effects. The very beginner knows that if, for example, a view requires two seconds' exposure when using a certain stop and a known plate, that by changing the stop for one whose opening has an area eight times as large, and the plate for one that is three times as rapid, the exposure then needed is one-twelfth of a second. Perhaps a drop-shutter will give an exposure near enough to that calculated to secure a good picture; but on another occasion, when one-twenty-fourth of a second is the required exposure, the lens aperture must be reduced by a diaphragm, and the view be taken only half as instantaneously as it might have been, or else the shutter must be quickened by an india-rubber band or a spring, the wish being father to the thought that the exposure is thereby suitably corrected.

The fraction of a second required can be practically obtained by expensive shutters; but the writer has found that very considerable accuracy may be ensured by using a rotary shutter which was made for him in mahogany, by a carpenter, for three shillings. About an hour's work afterwards, in adjusting it to the lens, blackening it, &c., and it was ready for use. The shutter described is in size suitable for a Dallmeyer's 5 by 4 rapid rectilinear, and the figures are drawn to a scale of one-half actual size. The shaded parts represent holes, or parts cut away.

The part that fits on to the hood of the lens is shown in fig. 1, and consists of a piece A, $\frac{1}{4}$-inch thick, faced with a thin piece B, and strengthened at back by a round piece C to give a firm hold for the screw on which the rotary part turns. This last is shown in fig. 2, and is a five-inch disc of thin mahogany with a hole cut out as shown, and a cylindrical piece E, which strengthens the centre, and has a small screw at F projecting far enough to tie a thread to its head. The dotted space, G, shows the form of the regulator; it turns stiffly on E, and serves to reduce the aperture in D. The figures show the proportion

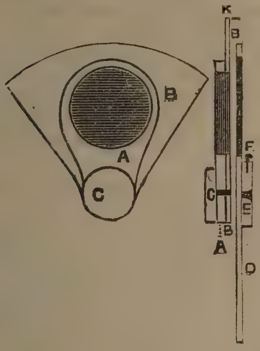


Fig. 1.

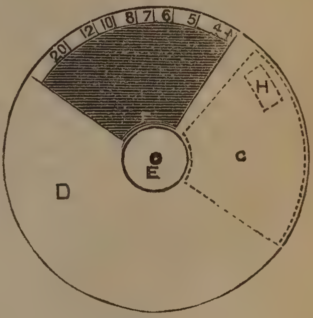


Fig. 2.

that the aperture bears to the whole circumference; one-fourth when fully open, and reduced by the regulator G to one-fifth, one-sixth, &c., to one-twentieth or less if desired. H is a piece of lead attached to the regulator, and is just heavy enough to determine that when at rest this part shall be lowest, and the shutter so kept closed. The revolving piece turns as easily as possible on a screw that is fixed tightly through B and A into the centre of C. A strip of cardboard fastened all along the edge of B as shown at K makes the apparatus practically light-tight when closed, in spite of a little irregularity in the surfaces of D and B. A piece of strong coarse thread or silk 12 to 18 inches long is tied to the screw F.

It is obvious that with such an apparatus, one revolution of the wheel with its aperture fully open will give an exposure of exactly one quarter of the period of revolution, provided that the motion is regular. By reducing the aperture, the exposure may be diminished to one-fifth or any other proportion desired. The single revolution is obtained by the cord attached at F, by giving it one turn round the cylinder E, and then pulling it off as a clock cord is pulled by the weight off the drum it is coiled on.

It was at first thought that by using a weight, a more regular revolution would be obtained, which would be more uniform at different times; but a trial soon showed that method to be impracticable unless modified by adding other parts to the shutter, and so increasing its cost, its liability to derangement, and its weight. The writer finds that by the simple hand method with his shutter, when the cord is coiled on the cylinder in the direction in which a clock's hands move, he could not produce a revolution which should occupy more than a quarter of a second, and unless violence were used, or a decided jerk given, the revolution could not be accomplished in much less time. Probably, indeed, this quarter of a second cannot be varied by more than a twentieth of a second without knowing it, although the experiments are done at different times; and with ordinary care and a little practice this amount of variation may almost certainly be considerably reduced.

In this particular shutter, therefore, the figures marked on it must be multiplied by four to give the fractions of a second indicating the duration of exposure, and one-sixteenth of a second is the longest exposure practicable by this method. The sixteenth of a second is perhaps the longest exposure required for ordinary instantaneous work, but this may be doubled, or otherwise increased, with a fair amount of accuracy by putting the string from F *over* the cylinder, and so drawing the wheel round. The reason of this decrease in rapidity of revolution is obvious, for when at rest the weight H is downwards, and the opening in D on the right hand side, so that when the wheel moves as first described, the orifice has further to go before it gets to the lens than when moving in the other direction; in the former case, also, the weight precedes the opening, while in the latter case it follows it.

With the shutter and lens as above described, the length of the opening on the revolving piece is about three times the diameter of the full aperture of the lens, a point which is held by some to be very important; when the opening is reduced to one-sixth of the circumference, it is still equal to twice the lens aperture; and not until reduced to below one-twelfth (exposure then equals one forty-eighth of a second) is the aperture of the shutter narrower than the diameter of the lens.

The method of timing the revolution of the wheel of such a shutter is very simple. A tuning-fork has a pin bent round the end of one of its prongs, so that the point projects at right angles to the plane of vibration of the fork. It may be sufficiently fixed by binding it on with cotton. By fastening this to the string, or merely holding them together, and drawing the pin point across a smoked glass plate (while the fork vibrates) at the rate which is to be determined, the wavy line on the plate will accurately show the number of vibrations the fork has made during its movement. The string should be drawn so that the wheel stops with its opening diametrically opposite the lens opening, for if carried out as above described, the wheel will make a fraction more than one complete revolution.

Then measure off from the end of the wavy line a length equal to the circumference of the cylinder E, and count the humps along one side of the measured piece of line. This number, divided into 430 if the fork is an A fork, as used for tuning violins, or into 256, if it is a C fork, will give the fraction of a second occupied by the revolution. The writer, in using an A fork, got numbers such as 107, 111, and so on, which are sensibly a quarter of 430; the time, therefore, was a quarter of a second.

There is, perhaps, nothing new in the shutter described, nothing new in the manner of using it, nor in the estimation of its rate of movement; but it may be new to some to know how it is possible to get "instantaneous" exposures with a fair certainty without going to the expense of a clock-work shutter.

TONING GELATINO-BROMIDE POSITIVES.

BY ARNOLD SPILLER.

Positives produced on gelatino-bromide films are generally far from satisfactory, whether as transparencies or in the form of prints. Considering the very great convenience of enlarging by means of gelatino-bromide paper, I believe that any simple method of improving the tones would be of great value. From some recent experiments of my own, I find that although at present it is not possible to obtain the delightful warm brown tone which is so characteristic of the albumenized paper process, yet a good black and an agreeable brown tint can easily be produced. The principle of my method is that originally suggested by Dr. Eder, viz., the conversion of the silver deposit into chloride of silver, and then re-developing with some suitable solution.

The gelatino-bromide prints, after development, fixing, and washing in the usual way, are soaked in a solution of chromic acid and hydrochloric acid till the whole of the silver image turns yellowish-white, the film is washed slightly and soaked for about ten minutes in an alum bath—containing one dram of hydrochloric to a pint of the solution—whereby the yellow chromic stain is entirely removed from the gelatine. The following is the formula for the solution of hydrochloric acid and chromic acid :—

Potassium bichromate	3 grains
Hydrochloric acid...	30 minims
Alum	40 grains
Water	1 ounce

After treatment in the alum bath, the film must be thoroughly washed for about half-an-hour in running water, and is then ready for re-development. For the latter process, I use hydroxylamine in conjunction with various alkalies, as recently described by me. To obtain a brown black tone, a solution containing hydroxylamine in connection with potassium carbonate is used, while for a platinotype black the alkaline carbonate is replaced by caustic soda.

In conclusion, I may remark that this method of toning is also applicable to transparencies made with gelatino-bromide plates, for which I specially recommend the latter re-developer, which produces a most charming "platinotype" tone.

TWO GOOD DEVELOPERS.

BY COLONEL DAWSON, C.B.

Pyrogallic Solution.

REMOVE the cork from a one-ounce bottle of pyrogallic acid, and pour into it 30 grains citric acid dissolved in six ounces of water, shake up, and then add to the contents in the bottle 4 ounces powdered neutral re-crystallized sulphite of soda. Fill the bottle with cold water up to the bottom of the neck, shake up until the crystals are dissolved ; transfer to a stoppered bottle. The contents will be about 10 ounces, and will keep a year at least ; every 10 minims represent about 1 grain pyro and 4 grains sulphite. (N.B.—Ordinary commercial sulphite is useless for the purpose). This solution is to be used with the two forms of developer.

Developer No. 1.

Make up the following solutions :—

A.—Ammonia 880	1 dram
Water	9 drams

This is a 10 per cent solution.

B.—Bromide potash	24 grains
Water	1 ounce

This is a 5 per cent. solution.

A good commercial gelatin plates properly exposed should develop perfectly with—

Pyro	2 grains
Sulphite	8 ,,
Ammonia ·880	2 minims
Bromide potash	1 grain
Water to make	1 ounce

or taking the three stock solutions—

P	20 minims
A	20 ,,
B	20
Water to make	1 ounce

Developer No. 2.

This is an excellent developer, and gives splendid tones; it is suitable for landscape work or transparencies for the lantern, but is too slow in action for professional studio work. A negative or transparency is not fully developed much under fifteen minutes; patience is needed, for any attempt to hasten development will be sure to result in failure.

Common washing soda	480 grains
Carbonate potash (sold by all druggists as London Pharmacopeia)	480 ,,
Bromide potash	20 ,,
Water to make	20 ounces

A good commercial gelatine bromide plate, properly exposed, either as a negative or a positive, should develop perfectly with—

Pyro	3 grains
Sulphite	12 ,,
Common washing soda	3 ,,
Carbonate potash	3 ,,
Bromide potash	$\frac{1}{10}$th grain
Water to make	1 ounce

Or,

Pyro solution	30 minims
No. 2	60 ,,
Water to make	1 ounce

The proportions given are for one ounce of developer; any number of ounces of either formula can be made with the same proportions. With both developers, I recommend half only of the No. 1 A, or half of No. 2 being mixed with pyro and water at first, the half in reserve being added as development progresses.

With No. 2 developer, certain precautions are needed. Plates thickly coated, or rich in gelatine, are apt to blister or frill. Plates prepared without being hardened by alum are apt to frill.

Forcing development by adding too much
blistering.

After a quarter of an hour or more, the colour of the developer should not be darker than sherry.

Allow time to force an under-exposed plate; I do not find any advantage (but the contrary) in forcing with excess of No. 2.

If a plate developed with No. 1 proves under-exposed, wash it well and apply No. 2; this may save it.

If a plate is over-exposed when developed with No. 1, wash it well and continue the development with

Pyro solution	60 minims
No. 2	30 ,,
Water to make	1 ounce

With No. 2 developer it is absolutely necessary that the plate should be well washed after development, and immersed for two or three minutes in

Chrome alum	1 ounce
Hydrochloric acid	1 dram
Water	20 ounces

then be again well washed and fixed.

The colour of image is warm black, the shadows as clear as glass, and no stain or discolouration of any kind.

WASHING TROUGHS.

BY S. D. MCKELLEN.

I do not like the syphon troughs; they have some bad habits, and are very uncertain in their actions. On one occasion, having left some negatives in one of them, I found in the morning that the water was being carried off by the syphon as it entered, and, as a result, the water had not risen in the trough for so long that the upper parts of the plates were dry. Even when the syphon does its work the plates are washed unequally, the upper edge of the plates receiving a very small proportion of the washing.

It may be said that if the plates are left long enough to wash the upper part, it matters little if the other parts get more than is necessary.

I answer that the matter of time alone is a sufficient objection to this statement, as the large proportion of time during which the upper parts of the plates are out of water must necessitate a much longer stay in the trough, and a much greater waste of water than there is any need for.

The washing troughs at present supplied by dealers are elaborate and expensive; most of them are grooved at opposite sides to support the plates, and some have elaborate arrangements by which the same trough may be used for a small variety of sizes. These are open to the serious objection that a trough can only be used for a very limited number of sizes, so that if a range of sizes have to be washed, two, three, or four troughs must be used.

The cheapest and most effective trough I know of is one large enough to hold the largest plates; grooves run down one side and across the bottom. In the angle formed by these grooves any size of plate will stand with perfect safety.

A hole is made in the bottom to carry off the heavier hypo. The supply of water is regulated so that more enters the trough than the hole will carry off. Thus the trough is always full, part of the water running off from the bottom holes, and part overflowing. The ingenious photographer can arrange a trough like this with the minimum of expense and the maximum of effect.

PHOTO-MICROGRAPHY—PHOTOGRAPHING WINGS OF INSECTS.

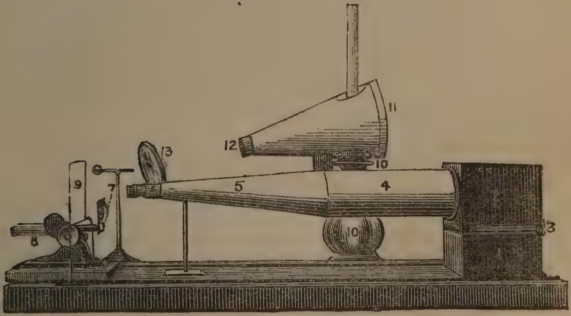
BY G. C. BIGNELL,

Member of the Entomological Society of London.

A DESCRIPTION of the apparatus by which I have obtained such good results in photo-micrography may be interesting to those who, like myself, are desirous of obtaining the neuration of the wings of flies, &c., and particularly so when it can be done by night or day. The greater portion of my work has been done in the evening after nine o'clock.

The insects I have photographed are magnified about eight times, and are chiefly those minute flies of the *genus Aphidus* that have found food and lodging within the bodies of the green flies infesting plants, commonly known by the name of plant-lice (*Aphides*).

I find the exposure to be about nine minutes to give the desired results.



1. Box on which the camera is fixed.
2. Body of camera.
3 Fine adjustment screw.
4. Tube of camera, which is made of stout card-board, and is telescopic.

5. This portion slides back into 4 ; the reason for having this movable is, that you can get your negative to the size required.

6. A 2½-inch object-glass (of a microscope), with the outer glass removed to give depth (length of focus). It is fitted with a cap having a circular hole of a quarter of an inch diameter in its centre.

7. Stage for carrying the object. The fly should be mounted on thin glass, and on its back, and fixed in position with gum tragacanth.

8. Stand, with stage, for focussing.

9. Screen.

10. Paraffin lamp with argand burner.

11. Reflector.

12. Engraver's reader (1¾ inch) fixed to the end of tube, which is made of cardboard.

13. Condenser. Without the assistance of the reader, the illumination on the screen will be of the shape of the flame of the lamp.

Great care should be taken in illuminating the back-ground (screen). In order to ensure this being properly done, I have a very light pencil mark on the screen, *placed directly opposite the object-glass.* The screen is about ¾ inch from the object; by putting it at this distance you remove the shadow out of range, and, consequently, it does not get photographed with the insect.

The box, 1, is fastened to the table with a thumbscrew. A slot is made in the table, just sufficiently wide for the screw to pass, so that the box can be slid to and from the object, if necessary. Box of camera 2 is fastened to the box by a rabbet on each side.

The screen is of unglazed white paper (blotting-paper is very good), fixed on a wire frame, made in the shape of a bed-room towel-horse. The table is three feet long, and 14 inches wide. This I rested on the table when I first commenced, but I soon discovered the floor shook in walking across the room. I then removed the whole apparatus to the chimney-piece, which I found too narrow; but, to get over the difficulty, I rested it on two pieces of one inch square boards or battens, and made it portable by sliding the battens under iron straps screwed down on the inner edge of the shelf.

AMMONIA.

BY S. BOTTONE.

"Is ammonia, as used in the dry-plate developer, in any way prejudicial to health?" This question was propounded to me some weeks ago by a young friend of mine. He had been somewhat scared by certain letters which had appeared in the PHOTOGRAPHIC NEWS; at the same time he admitted that he had felt no ill effects, although he had worked (professionally) with ammoniacal pyro for three years.

The question set me thinking; and I inserted a query in the PHOTOGRAPHIC NEWS in order to glean some information from others. Two replies only appeared—one from a gentleman who admitted that he was a sufferer from chest disease; another from one who quoted some doctor's dictum, unsupported by any practical experience.

As health is of paramount importance, it was thought worth while to investigate the matter thoroughly, and the following are the results:—

1st. In those manufactures in which ammonia is present in large quantities in the air breathed by the workmen, no ill effects accrue, even when the amount of ammonia is so great as to cause temporary inconvenience. Reference is specially made here to the men who manipulate the ammoniacal liquors of the gas-works, who work the Carrè freezing machines, and to those who collect the strongly ammoniacal liquid from the urinals.

2nd. The most delicate females seem to be absolutely unaffected by ammoniacal vapours, even when pretty strong; and no case of complaint of lung disease having been set up or aggravated by the use of the "smelling bottle" has yet come to light.

3rd. *Per contra*, the inspiration of dilute ammoniacal vapour appears to be actually beneficial in many cases of incipient catarrh, as evidenced by the extended use of Dunbar's "Alkaram" (the active principle of which is ammonia); while the almost magical improvement effected in the voice by the use of the Ammoniaphone proves that dilute ammoniacal vapour is, to say the least, not injurious to ordinary mortals.

CIRCUMVENTING THE ENEMY.

BY DUNCAN C. DALLAS.

"L'ENNEMI c'est" fog, if I may be permitted to vary Gauntlett's celebrated utterance. Yes, fog, the photographer's *bete noir*, is pre-eminently the enemy. A demon—red, green, yellow, pea-soupian, non-descript; fog—external, internal, but, happily, not eternal, for it is is possible to circumvent him. This short article is not intended to discuss the whole subject of fog, but to describe a method by which the writer, working with gelatine dry plates, was able last winter to be independent of so-called daylight, and at very slight expense. External or atmospheric fog prevailed greatly last winter, rendering it very difficult, even with gelatine plates, to work in a well-lighted top floor in Crane Court, Fleet Street. I had some difficult copying to do, notably from old bound-up copies of *The Norwich Mercury*, more than one hundred years old. The paper was brown with age, and rough. I circumvented the demon fog by blocking out all daylight and working with two one and a half inch Dietz paraffin lamps, one on each side of the subject to be copied, and screened so as to keep the lights away from the lens and camera. By this means I also got rid of the strongly marked grain of the paper, and the strong impression of the type. One lamp by itself would, of course, have exaggerated this grain and impression; but the cross lights proved an excellent corrective.

I had also a number of black leather boots to photograph. I did them entirely by means of the lamps. I got good effect by using one lamp as a principal light, and the other further off or turned down lower. Sometimes I used tissue paper in front of the lights when I had objects to photograph, but, as a rule, I found I got more "plucky" results by using the lamps without tissue. For developer I chiefly used as under :—

Pyro	5 grains
Washing soda	10 „
Bromide of potassium	2 „
Water	2 ounces

The three solid ingredients were weighed out separately and put into separate packets of paper ; no solutions being kept. This developer I call "the careful boy developer." Having mentioned it at one of the meetings of the Photographic Club, I was met by the objection, "Look at the trouble." "Very little," I replied ; "a careful boy can weigh out and packet a good supply in an hour." "A careful boy ! where is he to be found ?" and a hearty laugh greeted my suggestion. Well, I must admit that the careful boy is almost a *lusus naturæ ;* still, the term "boy" is elastic, and even if you do not secure the services of an "old boy," there are young ones to be got. Photography has such fascination for youth, that it is just one of the best schools for training "careful boys." "Boy," however, may include, metaphorically, your assistant of any age who is not too proud to do a little thing well. The great advantage of this developer is that you know with what you are working, and can easily change your proportions to suit your work, the exposure, or the class of plate. When the plate is washed after fixing, a clear yellowish tinge will probably show itself in the transparent parts. I have not found this the least detriment ; it can, however, be easily removed by using Edwards' solution—viz., alum, citric acid, and sulphate of iron ; this not only clears away the yellow tinge, but, at least in my experience, acts as an intensifier. I found it best to use this clearing solution very much weaker than recommended by Mr. Edwards. The manner in which I used it was to pour it on before washing away the fixing solution. Very moderate washing of the plate after this is required ; and, as I do not wash between developing and fixing, one of the tedious processes of gelatine dry plate work is reduced to a minimum. I may say, however, with regard to efficient washing, that a large dose of water is not needed. Sluice for a few seconds with water, then hold up till it drips from the plate. Repeat this about a dozen times, and you may pretty surely reckon no injurious hypo remains in the film.

A SIMPLE FILTER PUMP FOR THE RAPID FILTRATION OF GELATINE EMULSIONS.

BY A. PERCY SMITH, F.I.C., F.C.S.

The production of a partial vaccuum within the vessel receiving the filtrate has long been employed in chemical manipulations for the separation of dense precipitates, and also to save time in the ordinary processes of filtration required in the practice of chemical analysis. I see no reason why, in the absence of a centrifugal machine, the filtering of gelatine emulsions should not be hastened in a similar manner, considering at how small a cost an efficient filter-pump can be manufactured.

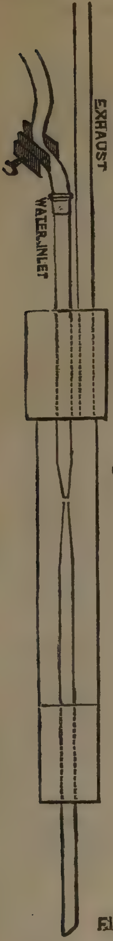


FIG. I.

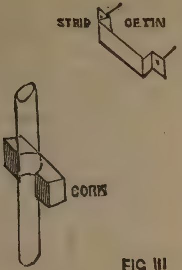


FIG III

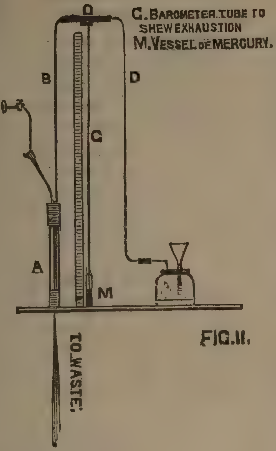


FIG. II.

A good many vaccuum pumps, worked by a flow of water, have from time to time been introduced to the notice of the public, but the majority of them are not completely satisfactory. Bunsen's is perhaps the best; but its production requires the aid of skilled workmanship, and the outfall tube must be at least 32 feet in length. This altogether forbids its use except upon the upper floor of a building.

The pump I am about to describe was designed by me some years ago. The principle of its construction is based upon that of Giffard's injector. A cistern of water, such as is to be found in every house, is all that is needed for a water supply; but the greater the head of water, the greater the power of the pump. If the water can be laid on from the main supply, nothing further could be desired.

Although a good head of water—and, therefore, pressure—is desirable, it by no means follows that a large quantity of water is required. I have found it desirable to attach a screw pinch-cock on the india-rubber tube which connects the pump with the water supply, so as to govern the quantity flowing through—a condition easily acquired by a little observation and practice.

As I have said, the greater the pressure of water, the greater the power of the pump, which is capable of lifting a column of mercury equal in height to that of the barometer at the time being *minus* the tension of aqueous vapour (the colder the water, therefore, the better). However, the pump will work very well, and lift fifteen inches or more of mercury with a head of ten feet.

The construction of the pump offers no difficulty to anyone who can bend a piece of glass tubing, draw out a jet, and bore a hole in a cork ; this last art is perhaps the most difficult of the three. Procure a glass lamp chimney about 23 c.m. in length, and some glass tubing of an internal diameter of about 6 m.m. Fit two sound corks to the ends of the lamp chimney. Through the centre of the upper cork pass a glass jet with a short nozzle (see fig. 1). Through the lower cork pass another jet, having a long sloping nozzle. The diameter of the holes at the ends of the jets may be about 1½ or 2 m.m. (The size really depends upon the water supply.) Care should be taken that the hole in the lower jet is not smaller than that of the upper jet ; they ought to be the same size. These two jets are placed diametrically opposite each other, and nearly in contact, so that water flowing down may pass smoothly out of one into the other, without striking the edge and spurting off into the chimney glass. A vaccuum is produced at this point. This is really easy to accomplish, however difficult it may appear on paper. Adjust an exhaust tube through the upper cork, and, to make the whole affair like an instrument that is intended to work, and not like a model, mount it as in fig. 2, where A is the pump, B C D the exhaust tube; but at B insert a three-way metal tube, and attach a barometer tube (same tubing as before), which dips into a vessel of mercury. The junctions with the metal tube may be made either by good corks or india-rubber tied on with wire (the glass tube must project inside the metal tube in any case), and all the junctions well covered with several coats of shellac varnish. The glass tubes may be fixed to a board in the manner shown as in fig. 3, by cutting a groove in a piece of cork, and screwing a strip of tin or brass over the whole.

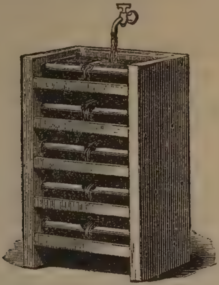
The final adjustment of the jets can only be made while the water is flowing, and the barometer tube, or the exhaust tube, is dipping under mercury in order to ascertain when the pump is doing its best. When the proper position has been found (generally obtained by twisting the jet, as the point is sure not to be quite central), the corks may be covered with electrical cement, or several applications of shellac varnish.

The filtering bottle requires no special description. Care must be taken to have a sound cork, and it is as well to soak it in melted paraffin to fill up the pores. The india-rubber which connects the bottle with the exhaust must be as thick as possible, and the ends of the glass tubes must be placed in contact, or the india-rubber will be flattened by the pressure of the atmosphere, and close the tube. A particular kind of rubber tubing is manufactured specially for such purposes as these, and cannot well be squeezed flat, as it has a diameter of two centimetres, and a bore of only four millimetres. However, ordinary black rubber tube will do very well for most purposes.

SCOTCH HOTCH-POTCH.

BY J. MCGHIE.

Washing Gelatine Negatives.—"Time tries all things," is an old proverb, the truth of which has often been rather unpleasantly verified in regard to the stability of negatives, and more particularly since the advent of gelatine as a vehicle for emulsion. Marvellously little time indeed is required to transform the printing qualities of good negatives that have not been properly washed. Change is one of Nature's inexorable laws, but it is quite possible to modify the conditions so as to secure the nearest approach to absolute permanency—viz., by the thorough elimination of the free salts. Many ingenious methods have been introduced, but I am unacquainted with any at once so simple and practically efficient as the one shown by the annexed cut, designed by Mr. A. Dinnie, Aberdeen. The only precaution to note is, that the shelves should be alternately bevelled back, so as to ensure a pool of water covering each plate, which in turn is displaced by the continuous stream of water from the tap. It may be constructed of zinc or iron, but preference is given to wood, jointed with white lead, and coated with a waterproof varnish.



Keeping Skylights Water-tight.—Perhaps in the photographer's many vexatious vicissitudes, few are more common than leaky studios, for no matter how carefully the glazing may have been done, the first shower after a period of dry weather generally discovers crevices in the putty. To those building or re-glazing studios (especially with wood astragals), I would suggest this simple cure, and for which I am indebted to Mr. Jamieson Beith, who assures me, after fifteen years' experience, that it is an infallible remedy. After giving the sashes one coat of paint, fix the glass into the rabbets with half-inch sprigs or flat pieces of metal, such as glaziers use for plate glass. Procure some common unbleached cotton-sheeting, and tear it into suitable lengths, an inch broad, to make it corner into the sash with facility; damp and fold it in two down the centre, using a hot laundry smoothing iron. Take thick paint, or what is better, reduce white lead to a workable consistency with boiled linseed oil and a little turps; coat the cheek of the sash, and (say) half-an-inch of the glass; lay the cotton on the wet paint, and press it well into the corners with an iron tool; give it a coat on the top in the usual course, and when dry (if at all carefully done) it is quite unaffected by atmospheric changes.

A Waterproof Varnish that will give an impermeable and inert coating to wood, &c., is a desideratum much required by those who prefer to make their own trays, baths, &c. From long experience the following can be recommended as possessing those qualities:—Take equal parts of india-rubber solution (made by dissolving raw rubber in benzole, or thinning down rubber paste to the consistency of a syrup with benzole or naphtha), and a brown spirit varnish known as "slake," used by French polishers. They mix readily. This varnish, when of the proper consistency, flows smoothly, and dries with a very hard, tough surface. The article should be thoroughly dry before being varnished; in fact, a slight heat both before and after coating is advisable; with some porous wood, several applications may be required.

ON INTERIORS.

BY H. MANFIELD.

THANKS to gelatine plates, interiors have become an important branch of photography, and, judging by recent exhibitions, one that has found favour amongst amateurs. Yet much of the work one sees is far from perfect, and though a great advance has been made of late, there is still room for improvement.

I may pass over such defects as under-exposure, lines out of the perpendicular, want of definition, &c.—these are simply the results of careless manipulation, and should only be found in the work of a beginner—but the points of failure to which I particularly allude are halation and excessive contrast. With most of the plates in the market it is next to impossible to obtain results free from these faults when one has to contend with windows or subjects likely to blur; and the reason is not far to seek—such plates are prepared for landscape or portraiture, and are not suited for special interior work. What is wanted is a plate thickly coated, and with more iodide in the film than is usual with commercial plates. Films of this class are not difficult to prepare, and where very trying subjects have to be photographed, the worker will do well to make some plates, expose them side by side with those he is in the habit of using, and compare results. I may remark that I do not wish to convey the idea that I undervalue commercial plates for general interior work—far from it—but recommend the use of thick bromo-iodide films for special subjects. As bearing on this point I may mention that a year or two since I was photographing at Beverley Minster with a friend; he was using plates—which were backed—by a leading maker, and I was working with films I had prepared as above described. When we developed the negatives, they were equal in quality, except that the windows in my friend's plates were completely spoilt by halation, while mine remained perfectly clear.

In reference to excessive contrast, I think, presuming the exposure to be correct, that the fault lies more in the developing than in anything else. A slow development, with the cautious addition of the ammonia as required, tends to produce a far more harmonious picture than the usual way of pouring the strong ammonia solution at one operation over the plate. I find the method I described in the last YEAR-BOOK, page 85, well suited for interior work, and take this opportunity of correcting the formula, which was misquoted. It is as follows:—

Pyro Solution (keeps good for about a month).

Pyrogallic acid	72 grains
Citric acid	24 „
Potassium bromide	32 „
Water	1 ounce

Dissolve the citric acid in the water before adding the pyro.

Ammonia Solution.

Ammonia ·880	2 drachms
Water	1 ounce

Keep in stoppered bottles.

To develop, give the plate the ordinary soaking in water, and pour over it—

Pyro solution	1 drachm
Water	3 ounces

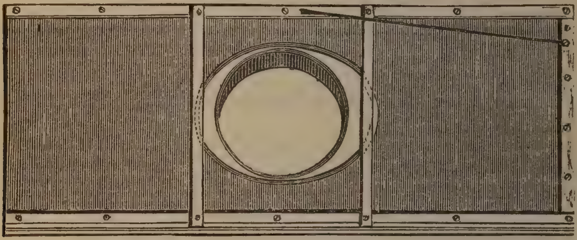
Allow this to act on the film for at least two minutes. Then put half a drachm of ammonia solution into the developing cup, pour the pyro from the dish into it, and back again to the plate in the usual way. On the appearance of the image, add another half drachm of ammonia solution gradually, and more if required.

AN INSTANTANEOUS SHUTTER.

BY A. R. HUNT., F.G.S.

AMONG the different sorts of drop and snap-shutters advertised, the amateur photographer may possibly find himself perplexed as to the instrument best suited to his requirements and the length of his purse. Whilst hesitating as to the best form of shutter for the highest class of work, he may, in the meantime, provide himself with an efficient temporary substitute at a very trifling cost. The desiderata are a few bits of woods, access to a turning lathe, a plane, a saw, a hammer, and some small wire nails.

Provided with these, take a piece of five-eighths inch deal about one and a-half inches wider than the outside diameter of the hood of the lens for which it is intended, and four and a-half times as long. After planing the piece of deal, bore a hole in the exact centre, and screw it on to the screw-chuck of a lathe. Turn a hole half an inch deep, to fit the hood of the lens; the hole, having been so far cut to the outside diameter of the lens-hood, must be now finished to the inside diameter, so as to leave a ridge, the thickness of the metal, for the hood to rest on. The finishing cut will have released the wood from the chuck; but before this, if desired, the five-eighths deal may be reduced to half that thickness, leaving a sufficient collar round the hole already bored. Now reverse the piece of wood, fixing it by the hole on to the outside carriers of an American chuck; bevel off the angle of wood in front of the ledge before mentioned, so that the frame of the shutter does not contract the field of view of the lens. The turning work is now complete. Take the lid of a cigar box, or other piece of hard wood, about one-eighth inch thick, cut it to the same length as the deal, but half an inch narrower. Take carefully-planed strips of hard wood quarter of an inch broad, and rather over one-eighth inch thick (they must be appreciably thicker than the slide), and place one on each side of the said slide on the face of the deal frame aforesaid; the three pieces will exactly cover the frame. Nail on the strips whilst fitting tightly to the slide betwixt them. Take a shaving off one side of the slide; it will now travel with accuracy and ease between the guides. Nail strips of wood one-third of an inch broad across the longitudinal ones, one-quarter of an inch from the circular opening—one on either side. The slide will now travel securely between the guides and under the cross-bars. Glue and nail a strip of wood across one end of the slide, to serve as a stop against the adjacent cross-bar. Find the centre of the slide between the wooden stop and the end; about this centre describe an oval, half as long again as the diameter of the circular opening, and with its shorter diameter about one-eighth of an inch longer than the diameter of the said circle (this to prevent the slide contracting the field of view). Cut out the oval as described, and bevel the edges to fit those of the circular opening below it. A screw in the stop at the end of the slide, and another in one of the lateral guides, the two connected with an india-rubber band, complete the shutter; though it can be used as a drop-shutter without these additions. A small hole in one of the lateral guides, under the end of the lower cross-bar, will accommodate a pin by way of trigger, for discharging the slide. When finished, it will be seen that the frame of the shutter is longer than is necessary; but the length will be found convenient to give support and protection to the somewhat fragile slide. When the lens-hood is two



and a quarter inches in diameter, such as Dallmeyer's No. 2 rapid rectilinear and instantaneous stereographic, an ordinary amateur's lathe may not be able to take a piece of wood of the full length prescribed, in which case the length of the frame may be curtailed, or the frame may be built up in pieces.

EXERCISE.

BY P. H. EMERSON, B.A., M.R.C.S., ETC.

To the photographer as well as the literary man, the words of warning must be continually preached, for it is the fate of nearly all men absorbed in sedentary and indoor pursuits to neglect exercise, and thus shorten their lives.

Most photographers will, no doubt, be surprised to hear that they should always be in training, for training only means regular hours, sufficient and well-chosen diet, and a proper amount of exercise. What, then, are the effects of exercise, that we should pay so much attention to it? In the first place, more pure air is breathed and more carbon eliminated; more water is drunk, which helps to wash away effete matters from the blood; the circulation is increased in force, and therefore all the glands and skin act better and carry off their impurities with greater energy; there is greater tissue change everywhere, so essential to our well-being. Exercise, then, hardens the muscles, strengthens the brain, and, in a word, makes a new man of the jaded worker.

What, then, is the dark side of the picture? First, we have indigestion, with its attendant evils, flabbiness of the muscles, a lowering of vitality, and therefore less power of withstanding disease. As a potent cause of the fatal tubercular disease, want of exercise is well known, as it is also of fatty degeneration of the heart. Half the unpleasantness of life arises through men and women taking insufficient exercise, impure air, and excess of food, which lead to an irritable temper and all its harassing concomitants. There is little need to warn men who are getting their living as are most photographers against the other extreme—excessive exercise; but this, too, has its long train of evils. This point leads up to the question of the quantity of exercise necessary for a man. This must vary with the individual. Professor Haughton has calculated that a soldier marching ten miles and carrying 60 lbs., is doing an ordinary day's work. Dr. Parkes lays down the law that a healthy man should walk nine miles per diem; but when we deduct the exercise taken in business—though not of a healthy kind in a photographer's work—the amount may be reduced a good deal. The form of exercise is another question, and for photographers, if walking is not pleasing, there is nothing like 'cycling, for riding will be beyond the means of most photographers. Dr. Richardson holds that tricycling is one of the healthiest forms of exercise possible, as no doubt it is, for all strain is taken off the heart, lungs, and large vessels, and is brought to bear upon the lower extremities, which are quite capable of it. The advantages of the tricycle have been so frequently pointed out in connection with photography that they need no further comment. Let every photograper, then, who prefers a clear head and a stout heart, a good digestion and a long life, to an irritable temper and a weak heart, to indigestion and a short life, arise from his sloth, and give some part of the day to walking or 'cycling, or whatever form of exercise pleases him, remembering that a sound mind is found only in a sound body.

SOME PRACTICAL HINTS ON PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY (TRANSFER SYSTEM).

BY E. J. ASSER.

It is difficult to determine the question as to the superiority of photolithography or photo-zincography; but it appears to me that, with regard to the artistic execution, lithography gains the victory, on account of the greater porosity of the material; nevertheless, photo-zincography must be diligently cultivated, because of its services in forming blocks for typography. For the application of both systems the means of obtaining a good transfer are of equal importance.

On former occasions I have written on the good results obtained by using unsized transfer paper with a layer of starch, and by floating the unstarched side on a rather concentrated bath of bichromate of potash, then hanging up to dry in a dark place. Nothing need be said regarding exposure and the soaking away of the unaltered bichromate.

Before the image on the damp paper is inked, one should apply, by means of wadding or a soft pad, a very thin layer of mastic varnish diluted with alcohol, and thinned by a considerable addition of turpentine, and a gentle dabbing should be kept up until the solvents have evaporated. A roller covered with velvet is used for applying the transfer ink, and soon the image appears, quite clear and vigorous. After this operation, any superfluous transfer ink on the whites is carefully removed by the moist pad or wadding.

The most simple and sure transfer ink, used for both lithography and zincography (the application of which I first mentioned many years ago), consists of common lithographic printing ink—not transfer ink—mixed up with oleïne, till it forms a supple but rather substantial mass.

The manner of preparing a lithographic stone for transfer is sufficiently known. To make the zinc plate ready, different methods are adopted. After many experiments, the following simple method has, in my opinion, ever proved to be the best. If a former image should still remain on the zinc plate, it is washed away with turpentine, and the zinc plate, when dry, must be polished with pumice stone till it appears as bright metal. The plate is now wiped with soft, clean blotting-paper, and these operations must be repeated till all traces of the old image have vanished.

After the transfer, the zinc plate is first covered with thick mucilage of gum-arabic, then again washed, rolled over with the usual printing-roller, in order to reinforce the transferred image, and etched with a weak solution of gum-arabic mixed up with a few drops of nitric acid. After rinsing, and a renewed gumming with gum-arabic, the zinc plate is ready for printing.

LANTERN SLIDES.

BY C. RAY WOODS.

"Now is the winter of our discontent," to most professionals, at least, and to some amateurs, perhaps. There are many, however, like myself, to whom winter comes as a slight relief; not that our ardour or enthusiasm has in any way cooled, but that the comparative cessation of negative taking affords us an opportunity of going over what we have achieved in the past summer, and realising, so to speak, our capital. Printing, it is true, goes on but slowly, but paper prints do not by any means afford the best method of converting our negative pictures into positive ones. If a negative is good, a transparency is the best way in which its excellence may be manifested; if the negative is bad, a transparency affords the best method of hiding or toning down its defects. As the dark nights approach, therefore, we polish up our lanterns, put in clean wicks, and get together the materials for producing our little three and a quarter inch pictures.

What method shall I use this time? In common with many others, I asked myself this question at the approach of autumn, and though I had got a decided bias in one particular direction, I thought I would try what was the very best results I could get by methods which, at first sight, would appear to be less troublesome. Gelatino-bromide I at once ruled out of court; not that it is difficult to get a plate that may be developed perfectly clean, but because it is impossible to come up to, much less surpass in beauty of results, those that can be got on gelatino-chloride. Bromide is rapid, chloride is slow; but as I desired to get quality, not quantity, I considered that gelatine would stand the best chance if I allowed chloride to represent it.

Most of my transparencies are reduced in the copying camera from 7½ by 5 plates, but even when I take up one of my old quarter-plate slides, I prefer copying to contact, on account of the greater sharpness of the result. My lens is a quarter-plate portait one, stopped down to three-eighths of an inch, although it would give a sharp picture with a larger stop.

My exposures with gelatino-chloride were from two to ten minutes, according to state of weather and density of negative. I frequently gave much longer exposures when I sat down to some other task to fill up the time, for gelatino-chloride plates may be over-exposed to almost any extent. My results were sharp, clean, and brilliant; but while they possessed a certain charm of their own, I could hardly say that I liked them as well as those prepared by collodion processes.

Collodio-bromide, as all are aware, is capable of giving very fine results, especially if the negatives are good; but the finer the emulsion, the slower it usually is. No emulsion transparency is, however, equal to a wet plate or a dry plate prepared in the bath, in fineness of grain. Collodio-chloride will give very good results, and I prepared a number of slides by this method, developing them by means of the ferrous citro-oxalate developer. A very fine emulsion is rather slow, but it gets coarser on keeping, and will become much quicker than a gelatino-chloride plate, giving an image possessing the same olive black appearance. In point of quality, collodion emulsions can only be beaten by the albumen process, or by processes in which the silver bath figures. After producing a number of slides by the methods already mentioned, I came at last to the conclusion to stick to wet collodion for preparing my slides, not only on account of the results it gives, but also facility in working and the control one has over the development. There are many now who do not care about the trouble of keeping the bath in order and the fingers clean. To those I would say that they may obtain transparencies of a very high character by any of the processes already mentioned.

The great difficulty with wet collodion is to get the glass thoroughly cleaned, and then the rest is easy. It is not advisable to resort to intensification if that can be avoided; my own experience being that a better result is obtained if the required density and proper brilliancy are attained by the one process of development. The principal noteworthy features of the method by which I work are as follows:—I make my bath strongly acid with glacial acetic acid, putting in from two to four drops to every ounce. My developer contains thirty grains of ferrous sulphate to the ounce, well restrained with acetic acid, and I do not allow much of it to flow over the plate. No intensification. I then fix in hyposulphite of soda in preference to cyanide, as it is not so liable to take out very fine detail, and obtain results of a brilliant black tone, with perfect gradation of light and shade.

DEVELOPMENT.—A WORD FOR OXALATE.

BY JOHN CROSBY.

Much attention has lately been given to various alkalies to replace liq. amm. in the pyro developer, and great difference of opinion has been expressed as to the advantages of sal. soda, carb. potash, and other alkalies, by those taking part in the controversy. But all seem agreed that to get rid of the fumes of ammonia is very desirable. I myself have been much surprised how little we have heard of the oxalate developer during these last few months. It seems to me to be the very best means of getting rid of many evils that accompany the use of pyro. Not only are the injurious effects of ammonia dispensed with, but the dangers of blood poisoning by pyro being absorbed through the skin, of which we heard so much some time ago; and much more comfort is experienced by the use of oxalate during the time of development. I think one reason why pyro has held its own so long is the fact that few photographers have worked oxalate for a lengthened time, only using it now and again as an experiment; hence it is generally supposed not to be under the same control as pyro. For some weeks I have confined myself to the use of oxalate development for all my studio work, and find it give me negatives quite as good and regular as with pyro.

My method of working is as follows:—Make up large stock solutions of oxalate of potas. and sulphate of iron. Most samples of oxalate will be found very alkaline. This must be corrected by the addition of oxalic acid until there is just a slight acid reaction upon the litmus paper; to every ten ounces of the iron solution add two drops of sulphuric acid. Now, when all sitters have left, develop the day's work. Make up three ounces of developer—three parts of oxalate to one part iron solution; divide this into three parts, to one part of which add half a drachm of a solution of hyposulphite (1 part hypo in 200 parts water); to the second part add 1 drachm of a solution of bromide of potass. (8 grains bromide potass to the ounce of water); the third part leave plain, and commence development with it.

It will soon be seen if the exposure has been right; if so, development may be finished with the plain solution; but if the picture flash out too quickly at once, pour back into the cup, and apply the one containing bromide; on the other hand, if it be found that the plate is under-exposed, the one containing hypo must be used. By these means it will be found most easy to correct any small faults of exposure. The power of the hypo in under-exposed plates will be found of great service; the negatives come up round, and any amount of vigour may be got by prolonged development. I do not know if this manner of working will suit all makes of plates; my experience has been with plates of my own make, and I am well satisfied with the results. Of course there is nothing new in all this; it is simply stating my experience of some weeks' use of the oxalate method of development, and my advice to all those that would like to give up the use of ammonia is, try this for at least a week, and see if the week's work will bear comparison with negatives made by pyro.

P.S.—I forgot to state that in practice the oxalate will be found quite as cheap as pyro. With the quantity named, I always develop six quarter-plates; more might be done with it, but density is not then so easily got.

PLATE-CUTTING GAUGES AND TESTING SHUTTERS.

BY RICHARD PARR.

The handiest gauge for cutting gelatine plates that I have ever seen, I make of the thin wood used to cover the tops of the cases in which eggs are imported. My diamond cuts exactly an eighth of an inch from the straight-edge; and, therefore, to cut up whole plates into quarters, I make two guages, one three and one-eighth, the other four and one-eighth inches wide. By planing up a piece of the wood long enough for the purpose, and glueing on a narrow strip of the same wood, I get the required distance from the edge to form the stop.

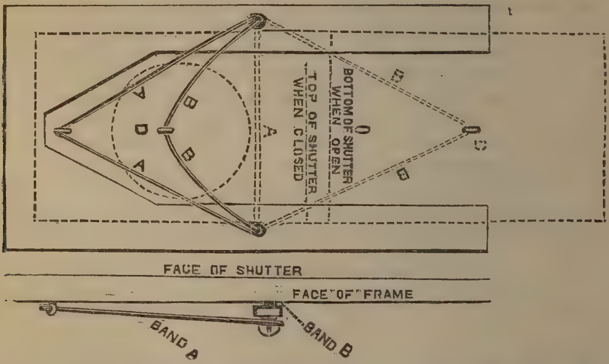
After the glue is dry, I plane the strip down to a shade less in thickness than that of the glass to be cut, and glue a strip of thin card one-eighth of an inch wide on the under edges of the wood where it comes in contact with the film. I find these a great convenience, and use them for cutting all sizes down to about one and three-eighths of an inch square.

We hear a great deal about the action of drop and other shutters. May I suggest to those having an optical lantern to test their shutters on the screen? They will need no other assistance in deciding on the best for their particular purposes.

THE JARVIS SHUTTER.

BY F. H. DAVIES.

VARIOUS devices have been employed to enable an instantaneous shutter to give a longer exposure to the foreground than to the sky. Most of them, however, are more or less complicated and expensive, and nearly all the devices with which the writer is acquainted are patented. The shutter which forms the subject of this sketch is free from all the above objections. It is the invention of Mr. Jarvis, a Chicago amateur, is extremely simple in construction and action, easily made by anyone with any "tinkering" propensities, and is very light and compact. As shown in the subjoined sketch, it consists of a vertical slide working in a frame in the usual manner, the frame being provided with a stop at the bottom to arrest the slide at the lowest or "closed" position. The back of the frame is solid, except where cut out to fit lens mount, as shown by dotted circle. The front is open,



being merely provided with guide strips for the edges of slide. This slide must be made of some light material—wood or ebonite being preferable. A small screw eye is inserted at D, while a pin, slightly bent downward, is put in at C. A rubber band, A A, is hooked under the latter, while another one, B B, is passed through the former. Both of these bands are screwed by their ends to the sides of the frame by screws as shown. The band A A should be just "taut" when horizontal; B B must be a little slack when the shutter is closed. The full lines in the sketch show both bands in the position they occupy when the shutter is at its lowest position, while the dotted lines show them at its highest point. A trigger is provided for releasing the shutter, but it was not considered necessary to show that, as there is nothing peculiar about it; a pneumatic attachment can be used if preferred. The action of the shutter is as follows:—The slide being in its lowest position, is held in place by the trigger, while the band A A is hooked under pin C. On releasing the trigger, this rubber band causes the slide to fly up, and gives it sufficient impetus to carry it far beyond the travel of the band itself; this impetus is exhausted in stretching the band B B, and in recoiling, this latter drives the shutter "home" again. As the band A A is, when released, somewhat in front of the end of pin C (see side view), the latter does not touch it in its descent.

The writer can speak from experience as to the successful practical working of this shutter. It gives exposures short enough for most purposes, works with hardly any jar (if not made too heavy), and there is nothing to it to get out of order. Either of the rubber bands can be replaced in a few seconds if necessary.

THE CHLORIDE-EMULSION PROCESS FOR PICTURES ON OPAL.

BY A. M. MACDONA, M.A.

I WAS induced to try the above from reading a short article on the subject in the PHOTOGRAPHIC NEWS last March by the Editor. Since then I have done a good deal of work with it of different kinds, and the more I know of it, the more I am charmed with it. Let me urge those who have not yet tried it to lose no time in doing so, and I feel certain that after a little practice in working it, they will be simply delighted with the results it will give them.

I will now, as briefly as possible, describe the necessary operations for the sake of beginners in emulsion-making, for whose especial benefit I give my own experience.

First of all, dissolve 240 grains of hard gelatine (Coignet's gold label) in 4½ ounces of distilled (hot) water in an ordinary glass-stoppered 10-ounce bottle, or small hock bottle. Into this pour a solution of silver nitrate 225 grains in 1½ ounces of water (distilled), and give a good shaking; then dissolve 63 grains of citrate of potash and 63 grains of chloride of sodium (both well dried on a piece of tin or a plate over a spirit lamp) in 1½ ounces of water. Pour this in small quantities at a time into the gelatine and silver solutions, shaking the bottle well between each addition. Then pour the emulsion out into a small porcelain dish to set; when set, cut it up and squeeze it through a piece of coarse canvas into a bowl of water (do this below the surface of the water). Pour the water off, and fill up the bowl with fresh, giving an occasional stir with a glass rod, four or five times. Strain the emulsion through a piece of muslin stretched over an ordinary jug; drain for half-an-hour or so, then put it into a small beaker, and slowly melt in hot water. When melted, pour it back into the bottle, and add to it 6 drs. of alcohol in which are dissolved 9 grains of salicylic acid and 3 grains of chrome alum dissolved in a very little hot water. Then filter the emulsion through two folds of an old cambric pocket-handkerchief or through any ordinary emulsion filter, and then proceed to coat the plates. Pot-opal glass can be bought of any of the large dealers in London cut to the usual sizes. Whole-plates cost about 4s. 6d. per dozen.

I cannot describe the coating of the plates; it is a knack, and has to be learned by practice, and is soon picked up by a careful man. When coated, level the plates on a large level sheet of thick glass. When the emulsion has set, place the plates on a rack in a drying-box or very dark cupboard. If placed in this over night, the plates will be ready for printing in the morning if the atmosphere is fairly dry. I may mention here that all the above operations may be conducted without detriment to either emulsion or plates in a good gas light, as the emulsion is very slow. What a boon this is, only those can appreciate who have lost their tempers and command over their tongues in trying to coat plates in semi-darkness.

On these plates, pictures are printed exactly as they are on sensitized paper. They print quicker than ordinary paper—about as rapidly as platinotype paper. There is some little difficulty in judging when they are sufficiently printed, inasmuch as the opal glass cannot be turned up in the frame and examined from time to time like paper. In my own practice, I have quite got over this difficulty by doubling back one end of the frame-back, and looking from behind through the opal towards a good light. By this means, after a little practice, considerable skill in judging the proper depth of printing can be gained; or if both negative and opal plate be pushed firmly to one corner of the printing frame, they will generally register accurately when pushed back into the same position after having been examined.

Pictures must be very deeply printed, because they lose depth considerably in the after processes. Well wash the plates when printed in water. Let them soak for fifteen or twenty minutes, then tone them with borax and gold bath, or put them at once into the mixed toning and fixing bath for fifteen minutes or so, until the required depth of tone is reached, then thoroughly wash them, and, when dry, have them framed in gold and plush, and they make beautiful pictures—very rich in tone, and of a transparent softness that at once captivates the eye.

Of course we cannot judge yet of the permanency of such pictures, but one thing we know is entirely in favour of their being permanent : the total absence from their composition of that *bete noir* of all silver pictures, viz., albumen in any shape or form.

I may say I tried citrate of soda with emulsion instead of citrate of potash, but this gave cold, grey pictures after toning, which I did not like at all.

I hope some of my brother amateurs will take up this process and try it for themselves ; I feel sure they will be as charmed with it as I am. It suits equally well for landscapes or portraits, while for interiors there is nothing to come near it.

ON THE RAPID MULTIPLICATION OF OUTLINE DRAWINGS WITHOUT THE CAMERA

BY LEON VIDAL,

Editor of the "Moniteur de la Photographie."

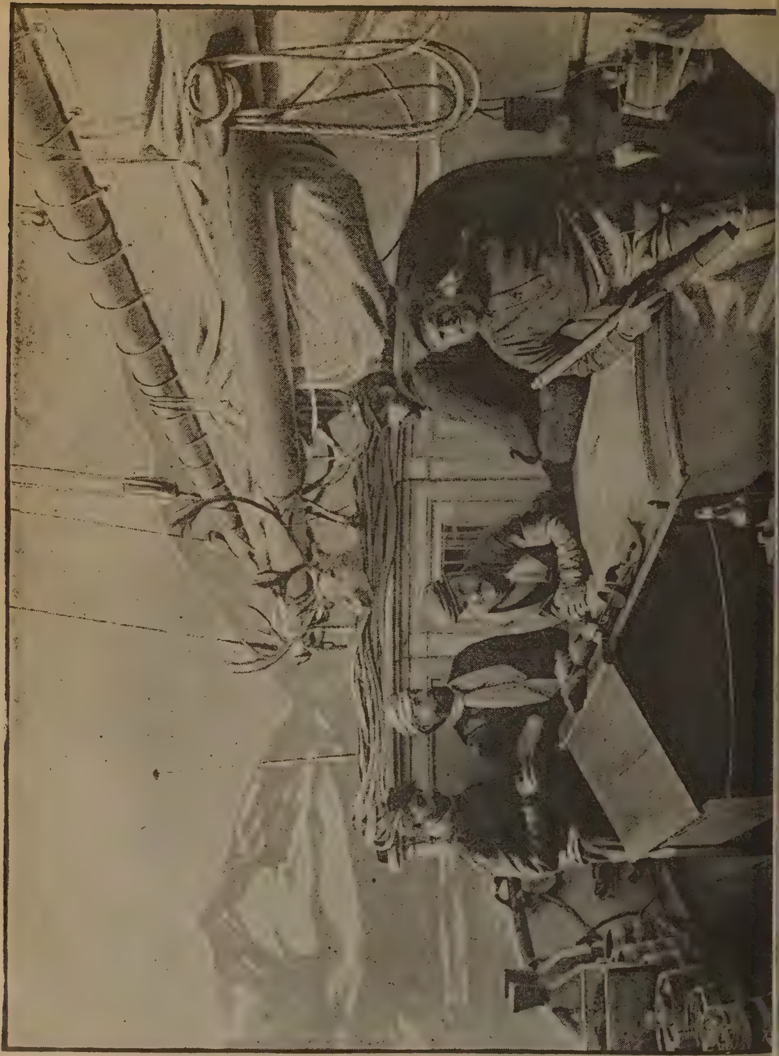
In many workshops, and especially in the offices of engineers and railway companies, it is often necessary to reproduce speedily and in large numbers original mechanical drawings in outline ; for instance, detailed portions of machinery, engines, signals, &c. There are many methods in vogue at present for accomplishing this work, but the one I intend to describe seems to me the most simple and rapid in carrying out, at any rate to those possessing no great knowledge of either photography or printing.

The outline drawing is carefully traced in ink on tracing paper. The next thing to be done is to obtain a negative by direct contact, so as to have a plate from which to print. A glass plate coated with bitumen might be used—the drawing placed over it would give a negative in white lines on a black ground ; but as this takes a considerable time, I advise another way, which consists of forming a carbon negative without any transferring. A thin sheet of paper of regular surface is strained on a drawing-board and damped; when dry it is brushed over with a mixture of gum-arabic in solution, and Indian ink in sufficient quantity to be tolerably opaque. This operation is easy enough, as it is not absolutely necessary that it is a perfectly even flat wash, so long as every part is covered and too great density of black avoided. The paper can be prepared beforehand as one wishes, for it keeps for an indefinite period in a dry place. To sensitize, take a saturated solution of bichromate of potash or ammonia, and pour it over the back of the sheet, taking care it does not touch the blackened side. The best way to guard against such an accident is to fold over the edges of the paper to form a tray. When the bichromate solution has covered every portion, the paper is hung up by a corner to dry in a dark place.

This operation can best be conducted in the evening previous to exposing in the printing frame, which takes place as follows. The drawing is first inserted, its face against the glass, then the prepared paper is placed next, backed with blotting-paper, and the back of the frame firmly fixed by the springs. It is exposed either to diffused or direct sunlight until a brownish impression appears on the reverse side of the prepared paper, the lines appearing white upon the tinted ground. One is then certain that the light has penetrated the entire mass of paper. At this moment, the printed sheet is removed, and placed in water to dissolve out all the bichromate which has not been rendered insoluble by exposure to light, and this process is facilitated by using a brush. When finished—that is to say, displaying perfectly white outlines on a black ground—it is washed in several waters, and left to dry. In this condition, owing to the relative opacity of the paper, the positive image would take a long time to obtain. The negative must, therefore, be rendered transparent by immersing in a solution of wax in turpentine in the proportion of 25 grammes of wax in 100 cubic centimetres of turpentine. Let it drain for a minute, dry the paper, and as soon as the turpentine is evaporated, place it between two sheets of blotting-paper and pass a flat iron over it hot enough to melt the wax disseminated in the pores of the paper. By this means the paper is waxed evenly, and a sufficiently transparent negative results.

To form a printing block, several methods may be employed. I will indicate two. The first consists in the use of a photo-lithographic tracing on zinc or stone. Take a sheet of paper of good texture, and coat it with a thin film of gelatine by floating it in a bath containing a lukewarm ten per cent. solution of gelatine, well filtered and free from air-bubbles, and when covered, hang it up by a corner to dry. To sensitize, dip it in a three per cent. solution of bichromate of potash for about three minutes, and leave it to dry in a dark place. When ready for printing, expose in a printing-frame behind the negative; the right exposure is known by the fact that a brown image is apparent at the back. The paper is next soaked] in water for about a quarter of an hour, to dissolve the excess of bichromate, after which it is taken out and laid on a perfectly even surface—glass, copper, zinc plate, or lithographic stone. Dry with blotting-paper, and afterwards with a soft rag so as to get rid of all moisture. Then pass a lithographic roller charged with ink over its surface, and when well inked, the superfluous ink is taken off by a smooth roller, and the impression is transferred to the stone or zinc in the usual way.

The second method is the following:—A zinc plate coated with bitumen is exposed to the light behind the negative. It is developed with turpentine, and the result is an image formed of bitumen upon a zinc ground. Gum-water containing gallic acid in solution is poured over the plate, and it is ready to be printed from, the bitumen image receiving the ink. If it were not for the length of time required for the sun to affect the bitumen, this process would be the more expeditious, as transferring is entirely avoided, and the results give finer detail. From the bitumen plate from 500 to 1,000 impressions may be taken successively.



OFFICERS AND MEN ON THE

"WILLEM BARENTS."

Negative by W. J. A. Grant during the Sixth Arctic Cruise. Block by the Meisenbach Co.

PHOTOGRAPHY AND LETTERPRESS PRINTING.

BY. J. WILSON SWAN.

The idea of photo-engraving arose soon after the discovery of photography. The splendid three—Niepce, Daguerre, and Talbot—all of them devoted themselves to the subject; Talbot with signal success.

All the earlier attempts at photography had for their object the production of *intaglio* plates adapted to copper-plate printing, the most beautiful, but also the most costly, of all the processes of press printing. A considerable degree of success was attained in this mode of photo-engraving at a comparatively early period, and for many years past prints of photo-engravings of this class have not infrequently been met with in illustrated books and in print-sellers' windows. More recently, but extending backward several years, photo-zincography, Lichtdruck, and other kindred modifications of the lithographic method, with photo-chemical processes dovetailed into it, have been in somewhat extensive use. Strange to say, amidst the multiplicity of processes for photo-mechanical printing, the process of all others most wanted—namely, a process for producing, by photo-chemical agency, blocks for letter-press printing—has come off most tardily of all; and, in fact, it is only now, or very recently, that photography has been adapted with success to the practical needs of this widely-used, and in every respect most important branch of printing. This is the more strange, since attempts—and by no means bad ones—were long ago made to conquer the difficulties of this form of photo-engraving—almost as early as those I have referred to as having been made on the other modes of printing, and which long ago yielded to the siege of invention and experiment. Readers of the old photographic journals will remember that in 1860, Paul Pretsch communicated to the Blackheath Photographic Society a paper in which he described a process for reproducing photographic pictures by ordinary letter-press printing, and that the number of the *Photographic Journal* for December 1st of the same year (No. 131, vol. vii.) contains a picture of Dover Castle printed, along with the type of page 347 from an untouched block of Pretsch's production. The print is a wonderfully promising beginning. How it happened that the process was [illegible] followed up with more practical success I am unable to explain. Possibly there were elements of uncertainty about the results, or delay in obtaining them, that hindered its adoption; at all events, it did not come into general use, and although twenty-four years have elapsed since then, it is only recently that any very marked progress has been made in the introduction into practical use of this urgently required adjunct of photography into letter-press printing.

The accompanying example of letter-press printing from a photo-chemically produced block illustrates the point of progress which has been reached by a process known as the Meisenbach process, which is in reality a development of a process which I described in a patent specification published in the photographic journals four years ago.

The problem to be solved was this—to translate the *continuous gradation* of a photograph into the broken gradation of a letter-press block. In the illustration here presented, the required change in the character of the shading is effected by means of minute chequer work, produced by printing through screens, the squares being more or less close, according to the degree of shade required, and vanishing to mere points at the grade next to white.

Excellent as this specimen is, it cannot be said that the process is universally applicable and leaves nothing to be desired.

Evidently there must be some loss of detail—in certain cases a serious and even an inadmissible loss—and one not compensated for here, as it is in hand-engravings, by the device of making the contour of the lines or dots agree with the character of the detail of form to be brought out; as, for instance, where curved lines, or dots arranged in curves, are employed to indicate the roundness and shading of the eyes or lips. There is therefore still room for discontent, and, let us hope, for improvement; but even with this drawback the results are in many cases so admirable that it would be hardly possible to equal them by hand work, however elaborate and costly. Moreover, the photo-engraving has a special and priceless value of its own in the fidelity and impartiality with which the hand of Nature does its work, producing, if not beauty always, yet always *truth.*

PAPER NEGATIVES.

BY C. J. SEYMOUR BAKER.

I HAVE been lately using Morgan and Kidd's ordinary enlarging paper for negatives with very fair results.

I have a Rouch's patent 10 by 8 camera with an ordinary dark slide, in which I have fixed slips of copper $\frac{3}{8}$-inch wide for the paper to rest, on. I lay a sheet of sensitive paper face down, then a sheet of opaque orange paper, then another sensitive paper, and so on, alternately, until I have from ten to sixteen sheets of each kind, and on top I place a sheet of glass to keep them flat.

The exposure is long—being about the same as for a wet plate. In Kashmir, my usual exposure with $\frac{f}{12}$ was on a fine day for buildings two to five seconds, and for open landscapes four to ten seconds.

After exposing, I place the dark slide in a changing-bag 28 inches by 12 inches by 5 inches, made of three thicknesses of twill, and having sleeves in the 5-inch sides near one end, and a slit at the other end, which rolls over and is covered by the focussing-cloth, and is perfectly light-tight. I remove the exposed sheet, and the opaque paper next it, and place them at the back of the glass, which operation takes less than a minute, and can be done anywhere.

I develop at night, using orange paper and cherry fabric round a lamp. The paper is immersed in water in a glass dish for about a minute, and for a 10 by 8 plate mix the developer—

Pyrogallic acid	... 4 grains
Bromide ammonia	... 2½ ,,
Ammonia	... 6 drops
Water	... 2 ounces

Turn the paper face upwards and pour off the water, when the paper will be quite flat. Pour on the developer, and the details should be out in one minute at the most; but care should be taken not to push the development too far, as the shadows should be quite white. Wash, fix for ten minutes in hypo 1 to 5; wash, soak for ten minutes in a saturated solution of alum, and wash again. If the negative is stained yellow, use saturated solution of alum 10 ounces, citric acid ½ ounce; after which, wash.

There are three ordinary ways of making the paper transparent;—1st. With white wax as in the old paper process. 2nd. Castor oil 4 parts, ether 1 part, brushed on the back; then warm, and when cool, with a rag take off the superfluous oil, and warm again. 3rd. Brush over the back of the negative a mixture of Thomas' india-rubber solution 1 part, pure benzole ½ part, Canada balsam 1½ parts.

I have, owing to want of time, only been able to get some rough proofs off my negatives, but several amateurs who have seen them are much pleased with the process.

I found 10 by 8 plates weighed eight to ten pounds a dozen, including packing, whereas nine dozen paper negatives weigh less than four pounds, which makes an immense difference. Then, with one wet plate, slide, and a changing-bag weighing a few ounces, I can take twelve to sixteen negatives; the whole set of apparatus taken in the field weighing only twelve to fifteen pounds.

ART STUDY IN CONNECTION WITH PHOTOGRAPHY.

BY EDWIN COCKING.

POSSIBLY at no period of modern history has art derived so much assistance from science as, at the present time, it has done by the agency of photography; and art is beginning to realise the capability of the chemically-produced record of the visible, to be moulded to her wants and wishes; but whilst this has become a fact, another one must also be equally admitted, viz., that the ardent pursuit of either—art on one side, or science on the other—does not seem capable of running on the same level. It would appear that if one rises, the other must be depressed; and if we analyse the subject still further, it will, I think, be conceded that those who have the gift of art feeling, have seldom the gift of science investigation, and *vice versa.* If we descend from the abstract, we shall find that whilst science may, for general practical purposes, be reduced in strength, as it were, and made a matter of just understanding a few simple formulas, on the other hand art demands that the experience should be quite the other way, it must increase in strength, and the principles of art be well-considered and always kept in mind. It is so easy to produce a record of what may be interesting, but which at the same time does not constitute a picture, that it is to be feared many do not recognize the difference between the application or non-application of the rules of art to pictorial representation. Therefore it is that I feel compelled to write stronger than ever upon the absolute necessity that exists for more earnest study of the art side of photography. In our meetings and social gatherings the constant source of interest is the science side, and no one more than myself can fully appreciate the necessity and the immense value attendant upon this most fascinating section of scientific enquiry; but it seems sometimes to be overlooked, that the greater portion of the results of photography is in the direction of pictorial records, and more especially this is evident each returning year, when the gathering of photographs in the Annual Exhibition of the Photographic Society of Great Britain shows the outcome of twelve months' further progress in pictorial photography.

It is not a little curious to observe how different in action is the conduct of those who take up photography—both amateurs and professionals—in respect to information relative to its art and science sides. It is a matter of every-day observation, and all must in turn have had a hand in it, that everyone asks his neighbour whether he has tried such and such a formula, and what the effect is, &c.; and a vast amount of real practical information is thus acquired. But, on the other hand, whenever do we hear of any question being put as to what course has been taken to secure results admitted to be artistic? These matters are left to each individual to do as seemeth best in his own eyes, and the result is, comparatively speaking, a halt on the way towards progress in pictorial photography.

What, then, is the object of my making these remarks? Why, nothing less than an attempt to induce all those whose proclivities tend with more force toward the art side rather than the scientific, to enrol themselves together for the discussion of, and mutual improvement in, art principles. Oh! that the same enthusiasm which imbues the scientific disciple of photography could be infused into the art-student. What a higher status would photography take! This requires no new society, but simply the coming together of those enthusiastic devotees of photographic art, to discuss and formulate the requirements necessary for such study; and this, when once done, will very soon find a home and opportunity for carrying out such views.

PAPER FILMS.

BY A. G. BROPHY.

I give these few notes relating to gelatine emulsion on paper support (Thiebaut's "Papier Peliculaire") rather under protest, because my experience is both very recent and limited; and as a similar article has been produced for the English market (Warnerke's negative tissue) it will probably be patronized and thoroughly well tested by competent persons before these lines are read.

Like many others, I have been desirous of getting quit of the weight of glass plates, but was deterred from trying the various makes of films by the trouble which, seemingly, according to all accounts, attended their manipulation. Receiving, however, from Paris a prospectus regarding Thiebaut's "papier peliculaire," and recollecting a note upon it I had read on page 154 of the YEAR-BOOK for 1884, I ordered two dozen of the 12 by 9 cntm., and am well satisfied with the results obtained; which are, apparently, the same as the same emulsion would give on glass plates. I have only two objections to set against its numerous advantages: the first is, that the gelatine emulsion with which the paper was coated, in my case was rather slow, about four to five times the exposures given in Mr. W. K. Burton's table—though I suppose there is no reason against a more sensitive emulsion being employed; and secondly, that on account of the comparative thickness of the film, fixing takes a long time. My *modus operandi* is as simple as it can be, and does not differ from that I employ for glass plates, save in the time required for fixing, and the more frequent employment of alum. Having no special carrier or frame, I simply gum the film-paper by the four corners on to a thin board (taking the place of the ordinary plate), by means of narrow adhesive paper—the borders of a sheet of postage stamps. The exposure given, the paper film is soaked for a couple of minutes in ordinary water, then developed by any of the usual developers. I use sulpho-pyrogallol, following the modifications according to subject, suggested by Dr. Eder in the YEAR-BOOK of 1883, also taking care that there is a full proportion of pyro; and that the development is continued sufficiently long to ensure a vigorous image throughout the film. The paper film is then rinsed under the tap, put into sat. sol. of alum for five minutes (thirty minutes would not hurt, and perhaps be safer), again rinsed, and put into the hypo fixing bath of fifteen per cent. strength, in which Thiebaut recommends a slight addition of alum, where it will have to remain probably at least thirty to forty-five minutes; taken out, rinsed, and put again in the sat. sol. alum; taken out, rinsed, and left for about an hour in water slightly acidulated with alum, and then given a good final rinsing. The water is then damped off the paper film between sheets of clean blotting-paper, and then left to dry between fresh sheets.

When *perfectly* dry, an eighth of an inch is cut off all round the edges with a pair of scissors, the point of a penknife inserted all round between the film and its paper support, and the film is then stripped off, beginning by one of the corners, without the slightest difficulty, and is now ready for putting on a glass plate for printing from either side. The film remains, without distortion, of the same size as in its original state, and I have come across no cases of frilling up to the present, provided that the aluming be duly carried out, and that the hypo is not over strength. The dimensions of a dozen 9 by 12 cntm. paper films, together with their cardboard etui, which opens like a card-case, are 5½ by 4¾ by ½ inch, and the weight only three ounces.

In conclusion, I have merely to add that if the development be put off to a convenient season, any number of notes can be written in pencil on the paper back, and that moreover the plates could be sent expeditiously and cheaply all over the world per Book Post.

[We may mention that to prepare the "*papier peliculaire*," M. Thiebaut takes a gelatinized sheet of paper, damps it, and attaches it on a glass by bands of paper pasted at the edges. When dry, it is covered with collodion containing about two per cent. of castor oil, and as soon as the collodion has dried, the tissue may be stored away for future use, or can be immediately coated with the sensitive emulsion.—Ed. Y.B.]

A READY WAY OF PLACING A PRINT CORRECTLY IN THE CENTRE OF AN ALBUM.

BY JOSEPH PAGET.

Take a strip of writing paper, and cut it exactly as long as the page of the album, K L, in fig 2; place the print to be mounted upon it in such a way that one end of the strip corresponds with the side of the print; thus, in fig. 1, A B C D represents the print, and E F the strip cut to the same length as the album. It is obvious that G F is double the width of the required margin on each side of the print when it is mounted. If, then, F be doubled back to G, and a crease made at the centre H, and the print and strip (without altering their relative posi-

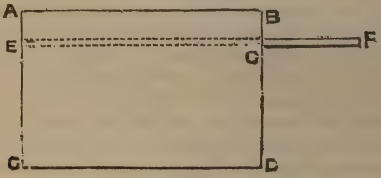


Fig. 1.

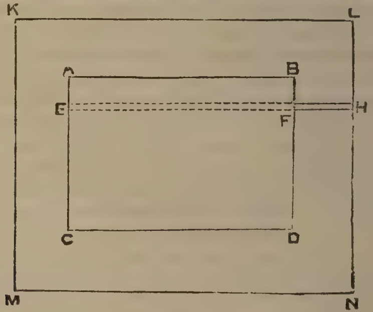


Fig. 2.

tions) placed on the album in such a way that H shall come exactly to the edge of the page, then, as far as the length of the page is concerned, the print is placed exactly central in the album, and the position may be marked. Take another strip of the width of the album, L N, and treat it in the same way; the print will then be central in the page.

If, instead of two strips of paper, a piece cut in the shape of an L is used, the position of the print, both in length and width, will be shown at once. The same paper may be used again for any size of print.

DEFERRED DEVELOPMENT.

BY JOHN SPILLER, F.C.S.

Much interest attaches to this question, and methought I had done a clever thing when sending a letter to the *Photographic News* in August, 1881, to say that on the 9th July I had succeeded in developing a capital negative of Carisbrooke Castle Gateway on a bromo-gelatine plate, which had been exposed in the camera exactly one year previously. The picture came out as well as I should have expected from the use of a fresh plate; and in answer to my direct enquiry—"Whether any of your correspondents had kept an exposed plate for a longer period?"—Mr. Herbert Berkeley reported (in the following week) that he had taken some negatives on Wratten and Wainwright's plates exposed nearly ten months before, but he had never actually kept them for a whole year. These periods of time are about double of that which entered into the calculations of the Paget Prize Committee when sending Mr. W. J. Wilson's trial plates on a voyage to the Brazils and back; but they sink into insignificance when compared with the much longer period covered by the recent exhibit of Dr. Berwick, who showed in his little view of Dumblane Cathedral (No. 481, Photographic Exhibition, 1884) the possibility of keeping a gelatine plate *four years* between exposure and development. The picture is a trifle hard, but under the circumstances cannot be considered otherwise than satisfactory.

In quite another category must be classed the interesting experiments of Mr. William Brook, late of Retford, who at the meeting of the London Photographic Society, June, 1876, showed a print from negative on a "dry plate exposed and developed fifteen years after its preparation." This was a Hill-Norris plate, one of a parcel bearing date February, 1861, and evidently well packed up until the day of its exposure in the camera fifteen years subsequently. As the author stated that he "had a few of these fifteen-year old plates left, two of which he intended to keep until they were twenty years old," I wrote for further particulars of later experiments, but my letter has been returned through the Post Office, marked "gone, no address." However, here we have the fact that Dr. Hill-Norris's plates may be preserved almost indefinitely before exposure.

We know that collodion emulsion has a moderate tenure of sensitiveness, but, as Captain Abney showed in 1877, the latent image upon such plates suffers gradual deterioration, and a negative could not be developed, or only imperfectly, after a considerable interval. The reasons are given in Captain Abney's paper,* and he states that "when such bodies as albumen or gelatine are added, we may expect other results, as then we arrive at different conditions if the emulsions have been prepared with an excess of silver nitrate." Similar results were described a year later by Mr. Warnerke, who was then working in association with Mr. Payne Jennings, and using emulsions spread on tissue and glass. A remedy for fog was pointed out, and a wash of carbonate of ammonia recommended.

The "different conditions" alluded to above are easily explained by the fact that bromine, when liberated from its silver combination by the action of light, is absorbed by gelatine or albumen, but not by pyroxyline; hence the old collodion emulsions go back after exposure, whereas the other organic compounds absorb the bromine (or iodine), and so prevent its return to the silver, in much the same way as was observed with less effect in the gum-gallic process.

PHOTOGRAPHING ON WOOD.

BY FRED. E. IVES.

THE following method, by which I have put hundreds of photographs on wood for the engravers, gives better satisfaction than any I have seen published. Notwithstanding the considerable amount of wetting which the block receives, there is never any complaint of injury therefrom, unless the blocks are very green.

A block—say 3 by 4 inches—is whitened by putting on two or three drops of thick salted albumen, then sprinkling on a little pure dry white lead (zinc white must not be used), and spreading and mixing them with the ball of the hand until the coating is thin, even, and smooth. Rub from the middle of the block, with alternate strokes to the right and to the left, occasionally turning the block to make the strokes crosswise, until the coating is so nearly dry that the last gentle strokes serve to smooth it almost to a polish. It requires some skill to perform this operation successfully, and it cannot be well described. If rightly done the coating will be thick enough to make a bright print, but will not chip or give any kind of trouble to the engraver, not even for the very finest work. The correct amount of albumen and white lead, as well as the proportion of one to the other, must be learned by experience, and will be found not to be the same for all blocks.

When the coating is perfectly dry, it may be polished with a brush, then sensitized by covering the surface for exactly two minutes with a sixty-grain solution of silver nitrate. Rub off with a blotter, and when perfectly dry, fume twenty minutes with ammonia. After printing (under a reversed negative,) wash with running water not more than thirty seconds, and then tone and fix at once by placing face down upon a solution of hyposulphite of soda (1 to 6,) to which has been added a pinch of carbonate of soda and a little chloride of gold. Twenty minutes' fixing is right, after which the block is washed, and allowed to dry, when it is ready for the engraver.

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* Photographic Journal, vol. 2 (new series), p. 24.

The salted albumen is made by adding eighty grains of chloride of ammonium to the well-beaten white of six fresh eggs; a few drops of ammonia may be added, but no water. Blocks which are white and porous from over-seasoning must be coated twice with the albumen, the first application to fill up the pores of the wood, and the second (after the first has dried in) to prepare the surface.

I once thought it would be necessary to employ a method which did not require so much wetting of the block, but found that the thick albumen which was rubbed into the face of the block, and then coagulated by the silver nitrate, preserved the wood from injury. In skilful hands the method is quick and reliable, and the results are very satisfactory.

MIND, *NOT* MATTER.

BY HERBERT B. BERKELEY.

THAT the public at large should be impressed with the idea that nothing more is necessary for constituting a full-fledged photographer, equal not only to "taking," but also to doing justice to, any object that may be presented to his camera, than that a man should become possessed of—to use an American phrase—"a box and tube," together with a packet of plates, is perhaps, all things considered, not a matter for very especial wonderment; but that the possessor of this magical apparatus, or "machine," should continue to hold for any length of time not very dissimilar ideas, is strange indeed.

It is true that professional photographers, as well as those who are "only" amateurs (I am afraid the use of the word "only" is to provide an excuse for producing inferior work, for in what way are amateurs debarred from executing photography of the highest class?—are there not many instances proving that they are *not* in any way debarred from executing works of the highest order?) are not behind-hand in admitting that So-and-so and Such-an-one are far ahead of themselves in the production of all that is good in photography? They go further; they look upon So-and-so and Such-an-one as exceptional phenomena, men out of the category of ordinary comparisons; for all that, while in certain cases placing the man far before the means, in this respect very properly differing from the view of the more unthinking portion of the public, they yet contract the habit—when comparing their own productions with that of others, whose work, though admired, is yet not worshipped—of thinking much more of the means than of the man—in other words, than of the way the means are used.

We all of us know how it is when photographers, who have each of them, so to speak, perched upon neighbouring rungs of the photographic ladder, meet together. Let one of them show a good series of photographs, or let reference be made to a certain good photograph by one of them (I refer especially to the more technical qualities of definition, roundness, detail, brilliancy, rather than to composition and purely artistic lighting of the subject, which latter involves something more ordinary judgment). What is the nature of the remarks we hear? Are they not to this effect? "You must have a first-rate lens." "I suppose you use a small stop." "Whose plates?" "Alkaline or ferrous-oxalate developer?" "Ah, I see; I think I must give up ferrous-oxalate." "And the shutter works between the lenses?" (Mental note on part of enquirer to go home straight and saw his lens mount as nearly as possible into two parts!) Many other questions of a kindred nature are put to the individual who, unknown to his fellows, has advanced several rungs up the photographic ladder of progress towards success.

Now it does not seem to have occurred to the minds of these enquirers that it is neither the lens, nor the stop, nor the plates, nor the developer, nor the shutter which especially contributes to the excellence of the results under examination—except, of course, in so far as that each of the foregoing in some form may be necessary for the production of similar effects. The real cause of the excellence is in the *use of them!*

The moral of my tale is this: That if, instead of thinking to derive benefit by the obtaining of answers to such questions as I have endeavoured to illustrate, we were to set about observing for ourselves the effects produced by various kinds of lighting, by judicious focussing and subordination of various parts, by studying the plates and the action of the developer upon them under varying conditions, by looking upon the apparatus generally as only a means to an end, and upon *judgment* as the fount of all good work, guiding us to the proper use of the means; if, I say, we were to do all this, how infinitely nearer we might soon be to the goal to which we all aspire—the top rung of the photographic ladder!

ON DEVELOPMENT, AND ON GELATINO-CHLORIDE PLATES.

BY H. WILMER.

THERE is no excuse during the spring or summer months for under-exposed negatives, but such things occur frequently in the winter time; and I was unpleasantly reminded a few days ago of the advent of the dark days by finding that some portrait negatives which I had taken were considerably under-exposed.

I adopted a method (suggested, I think, by Colonel Stuart Wortley) of soaking the plates for about ten minutes in a bath of ammonia diluted with water to the extent of about 20 ounces of water to half-ounce ammonia.

The method may not be known to all your readers, but it is highly successful, and will often produce a good printing negative when all other methods fail. After soaking for about ten minutes, the solution is poured off, and the ordinary developer applied.

With regard to transparencies on gelatino-chloride plates. I have been lately turning my attention to these, and can strongly recommend their manufacture to all amateurs as an unfailing source of amusement. Many like myself have, no doubt, numbers of negatives stored away, which may be unsuitable for printing owing to some slight blemish, but which will often give a very nice transparency over so small an area as the latter requires.

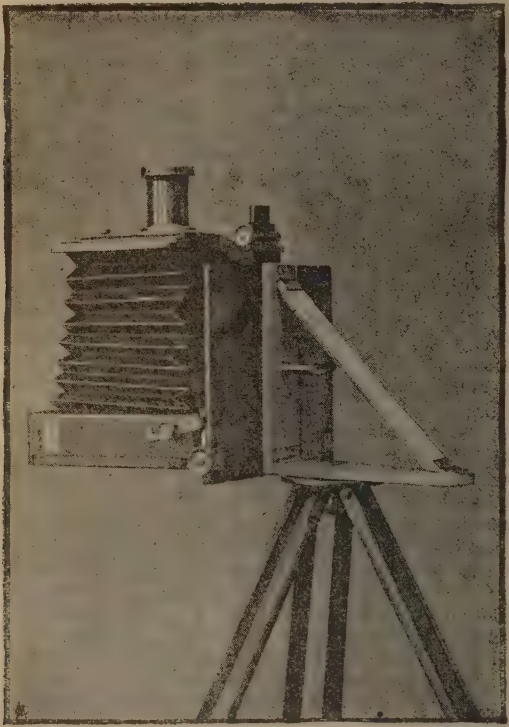
A mask of black paper between the negative and the plate is a necessity where the negative is larger than the plate, in order to prevent the reflection of light from the edges of the plate striking in and fogging the transparency. The mask should lap over the plate about 1-8th of an inch all round, and extend beyond it about half-inch. Scrupulous care must be exercised to prevent the slightest trace of hypo getting into the developer, otherwise general fog is the result. When properly developed, the sides where the mask was, and the high-lights, should be perfectly clear glass.

LOOKING UPWARD; OR, HOW I GOT MY COAT OF ARMS.

BY RICHARD KEENE.

At the fag end of this last photographic season—may we never see a worse!—I had a commission to photograph an old hall of the Jacobean period from various points, including a coat of arms done in plaster on the ceiling of a dark staircase landing. As this was quite a new experience to me, and may be so to others, I have thought it worth while to describe how we set about it. I say we, for, like the organist, I had an assistant to work the bellows—of the camera.

When we came to the scene of our labours—Bentley Hall—we found a fine porch which at once arrests the eye, and is, indeed, the best and most noticeable feature left unaltered in the building. We found the place inhabited by four or five farm-labourers, and one servant girl. It still possesses some good rooms and remains of fine plaster-work ornamentation of the period in which it was built. The girl showed us up the old staircase, and we found the landing dark indeed. We soon set to work. To the top of the tripod we screwed a frame of wood in the shape of a right-angled triangle. To the upright side of the triangle was screwed the camera, which thus pointed vertically. A lens giving the proper sized image was used, and we exposed two plates to ensure getting our picture. All this may sound very easy and simple, but remember, we did not know either the distance or size of the object till we got there ; then the darkness of the place, and the innumerable coats of whitewash, made it most difficult to focus in the awkward position we had to assume. Fortunately, the ceiling was high enough to use the folding tripod at full-length, so we had not to lie on our backs as we half expected. It may, perhaps, be well to carry out the similitude of the organist and the organ-blower: the shorter one (call him the organist) strove to see the image on the ground glass; the other (call him the blower) worked the bellows – or, in other words, turned the focussing screw to and fro till it met the approval of his shorter friend struggling in the shade below, and who was very difficult to please in his cramped



position. Nor was it till the blower got the maid's sweeping-broom, pinned a white card with a bold black cross on it to the end, and held it up in contact with the coat of arms, that the organist felt at all sure he had focussed aright. The triangle is made with hinges so as to shut up into a small compass, the hypothenuse or longer side being loose, and fitting to the others with half-hinges; when these are pushed home, it becomes a strong and rigid frame, capable of holding the heaviest camera without danger. As the above dodge is not a patent, we can recommend it to anyone who may have to execute similar work. It will also be found useful in exposing for skies, as the camera can be tilted to any angle without altering the legs or toppling over.

It boots not to tell how, while we were at our dark job, the sun went behind gathering clouds, and we only just managed to get our out-door views done before the drizzle came; nor how we fared in the commissariat department. Suffice it to say we were complimented by our coachman saying, "You've been out before, sir." We packed up our traps, the horse was put to, and we had another enjoyable fourteen miles drive home again, for the drizzle gradually diminished, and the sun came out once more to laugh at us, and make the landscape smile again through its tears. With some degree of anxiety we developed our plates; they proved to be well-exposed, and the results all good.

[Mr. Keene's vertical arrangement of the camera, which is illustrated to the reader by means of a Meisenbach block, may be useful in several ways. Turn the lens downwards, and an engraving or other flat object may be conveniently copied; while if the lens is directed towards the horizon, the length of the plate will take a position the reverse of what it was when the camera was bolted on the stand in the usual way.—ED. YEAR-BOOK.]

TENERIFFE PHOTOGRAPHS OF 1856.

BY C. PIAZZI SMYTH,

Astronomer-Royal for Scotland.

WHEN thirty long years save two have passed over a man's work, intended only to be useful for the time at which it was performed, how completely in general "past is past, and gone is gone"; especially if that former work lay in scientific and physical paths; for precisely therein centres the chief march of the nineteenth century, creating whole new sciences every few years.

It is precisely, too, amongst the triumphs of the present age that photography holds a distinguished place; and each of its later developments has given it such increased powers for accuracy, for artistical effect, for universality of application, that I certainly had never expected that the little, rough, dust-speckled, pinholey work I was just able to get through in 1856, under difficult circumstances, would be asked about after such an interval of time.

Yet not only has exactly that question been this moment put to me by the all-caring-for Editor of the PHOTOGRAPHIC NEWS ALMANAC, but accompanied with the hitherto, unheard-of offer, that if I have preserved any of those old examples of photography, he will be happy to reproduce a couple of them as accompaniments to the type of a letter-press description in the ordinary printing-press.

Oh, shade of Fox Talbot! what wouldst thou not have said to such a "vulgarization" of the ineffable tones of a too-fugitive silver photo, on even the best of Whatman's paper?

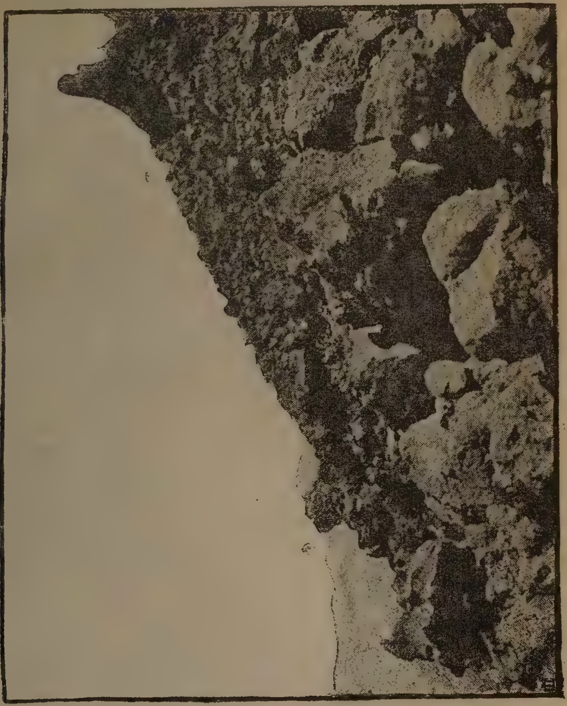
But that is a point much more for the Meisenbach Company to discuss than for me; my sole part on the present occasion being to describe in the fewest possible words how and why the negatives were taken in 1856, and their subsequent positive copies preserved to the present day.

It was in the eventful spring of that year, when Government was in a desperate hurry, as it so often is, to get up a grand show of the many wooden gun-boats they had hastily built for service had the Russian war lasted longer, that the Lords of the Admiralty, through Sir G. B. Airy, granted me a small sum of money with which to make a tentative experiment of the astronomical capabilities of the upper part of the Peak of Teneriffe, "high above," as Newton expressed it in his day, "the grosser clouds of the lower atmosphere." The late Robert Stephenson lent his beautiful yacht *Titania* to my Wife and self to reach the base of the Island Mountain; and instruments of I know not how many kinds were conveyed there in it; for every *savant* in Great Britain seemed suddenly impressed just then with the notion, that his particular hobby of observation ought to be the chief subject of my practical experiments in the thin and clear air two miles high.

Until the last moment before leaving England, no photography had been provided for. But just then, by a happy chance, appeared on the scene that genial spirit, so enthusiastically known to his friends as the Baron de Forrester of Oporto; and agreeably with his all scruple-overcoming eloquence, the last available £10 note, and something more, was laid out in a little stereoscopic camera, with Latimer Clark's ingeniously adjusting stand for successive converging pictures on the same glass plate, a very little tent (so-called), and a box of chemicals for wet collodion.

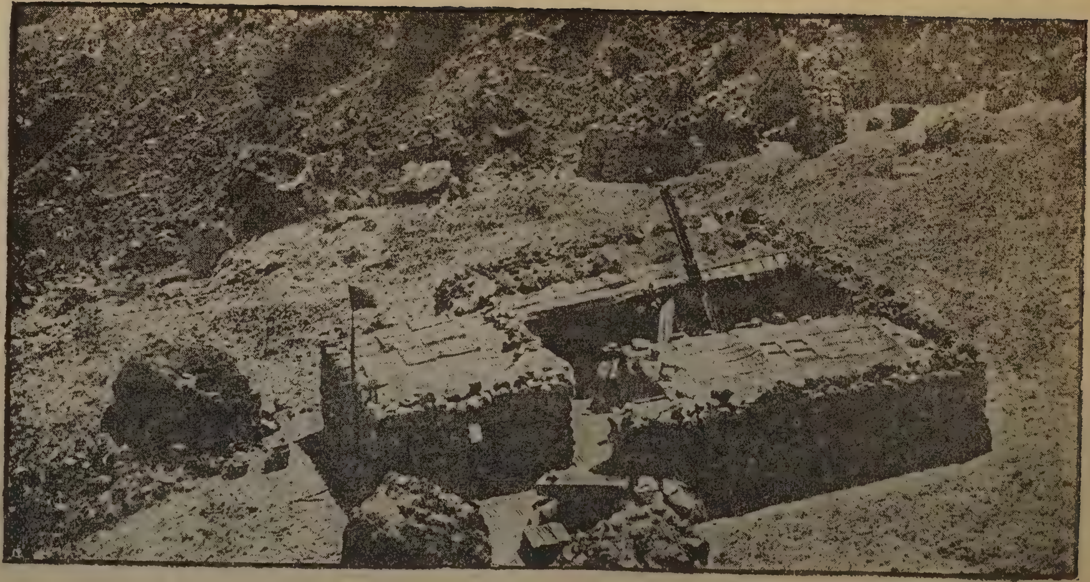
There was some practising with the apparatus going down the Channel, a little more on reaching Teneriffe at the town of Orotava; but the chief use of the whole was at Alta Vista, 10,500 feet in altitude, and close under the summit of the Peak itself, 12,170 feet high; besides, take note, being some 5,000 or 6,000 feet above the level of the clouds which, all the summer long, covered in both land and sea below. But above those clouds, how clear and how blue was the air! No red and yellow haze which produces fog-like effects, or "aerial perspective" in photographs, as some persons euphuistically call it, even at distances of a few yards; but there was in place of that, a directness of the rays of light, which enabled every stock and stone, every light and shadow to be made out by microscope on the negative of a mountain side four miles off, and whether at mid-day or evening.

But I am neglecting preliminaries. Oh! the collodion of that epoch, with its acrid fumes of decomposing ether, inside the unventilated little black tent under a vertical sun: did it not threaten to put out one's eyes while waiting for the film to "set," before plunging it into the gutta-percha bath, covering it up and rushing out into the open air, the wind, the dust, anything to cool the burning eyes? And then the public demand being at that time all for negatives that would print strongly on paper, with hideous snow-white skies, pyrogallic developer, with its heavy deposits, was all the rage.



LAVA SLOPES OF THE PEAK OF TENERIFFE.

How I regret it now; for with the few photos I took with iron developer, they were always sharper in definition, quicker by half, and more full of detail everywhere. But they were despised then, and held to be only good for backing up with black varnish, and being looked at by reflection as direct positives, but reversed right for left. So backed up utterly with the blackest of black varnish all those iron photos were. Yet, after our return home, on finding out their good qualities of detail and definition, and being determined to hold by transparent positives—



THE ASTRONOMICAL STATION AT ALTA VISTA, TENERIFFE.

copies on glass, rather than any prints on paper, and realizing how very thin a negative may then be utilised—I dissolved off the black varnish from those backed-up direct positives, by swimming them in a plate of chloroform, and made magnified copies of parts of them, viewed as negatives, on various sized glass plates up to 9 by 7 inches—of parts of the negatives only, for the regular jog-trot 3 inch square pictures of the stereo-camera of 6 inches focal length invariably contained too much foreground for artistical effect; and a new power was realized in the copying camera of bringing special parts of the whole scene into more prominence than they had in the original photograph; of placing the sky-line high or low, instead of always along the middle of a plate, without improperly tilting anything; and even making sometimes two or three different pictures out of one field camera subject.

Here, accordingly, are two bits magnified out of two stereo three-inch square plates, one of them a pyro, the other an iron, developed negative; though the latter, to tell the truth, passed the first two or three years of its existence as an opaque positive backed up with pitch for very blackness. One of them represents the broken up cindery character of the lava slopes of the Peak; and the other gives an idea of the Astronomical Station, hastily erected at Alta Vista, in 1856, and, unfortunately, never used again, although photography testified so eminently to the capabilities of the place for all the more precious kinds of *excelsior* optical observation.

MICRO-PHOTOGRAPHS IN THE STEREOSCOPE.

BY J. THOMSON, F.R.G.S.

One of the most interesting phases of micro-photography is the production of stereoscopic effect, by combining two micro-photographs taken under different conditions of light.

Perhaps the simplest and most certain mode of compassing this end is the following.

Take an ordinary micro-photographic camera attached to a microscope, and the source of light an Argand lamp placed in front of the object-glass, with the instrument in a horizontal position, ready for work. The object selected for enlargement may be a transverse section of wood, whose enlarged image shall occupy the space of a stereoscopic photograph. After the operator has taken a negative, before proceeding to secure a duplicate, he must re-adjust the light by moving the Argand lamp two or three inches to right or left, in a line parallel to the stage of the microscope. A twin negative must now be taken. The only difference between the two impressions is, that the shadow is thrown to the right in one, and to the left in the other. Prints from these negatives, mounted on a stereoscopic slide, produce the effect of relief or intaglio alternately by changing the relative positions of the prints from right to left and left to right.

In the case of an extremely minute microsopic object—a diatom, for instance—who can determine its true form? Who can say whether it is convex or concave? By a slight alteration of focus it may appear under the microscope first one and then the other. This objection has been raised by microscopists to micro-stereoscopic photography. It appears to me that doubt on this point may be set at rest by selecting a microscopic object of known form, such as a section of sugar cane, or a crystal standing in relief from the glass slide.

Twin impressions of such objects—first with the lamp on the right, and second with the lamp on the left—will only produce relief in the stereoscope when mounted in one position on the steroscopic slide; reverse the position of the prints, and the result will be intaglio. If, then, one observes the precaution of marking the negatives "right light," "left light," and the same rule as regards their relative positions on the slide, the result will be a summary of the true form of the object in the stereoscope. Minute objects, about whose form there may be doubt, should thus be forced to yield up their secret, and so contribute to the advancement of science.

REDUCING NEGATIVES INTENSIFIED WITH MERCURY.

BY A. DONALD.

It is often observed that there is no satisfactory method of reducing mercury intensified negatives. As my practice all the season has been to reduce, when necessary, negatives intensified with mercury, I am inclined to say the assertion requires qualifying. When the cyanide of silver method is adopted, my mode of operation is an extremely simple one. The only danger is of over-doing it, and allowance must be made as regards the difference between a gelatine negative when in a wet, and on the other hand a dry, state.

If a negative be too dense when removed from the cyanide of silver bath, flow over it a weak solution—say two ounces of a saturated solution to a pint of water—of hyposulphate of soda. The action which follows is a rapid one, and a second or two sometimes suffices to produce the requisite effect. Water should be handy, into which the negative should immediately be plunged and well rinsed before examining it. On examination it will now be found more harmonious, and the colour unchanged, excepting in so far the now thinner film. If the reduction be insufficient, the operation can be repeated. The negative requires, of course, to be well washed afterwards to free it from hypo.

As to the keeping qualities of negatives so reduced, I can only say that if the primary operations of fixing and thorough washing be properly performed, I note no difference, as far as my experience goes, from other negatives not so treated.

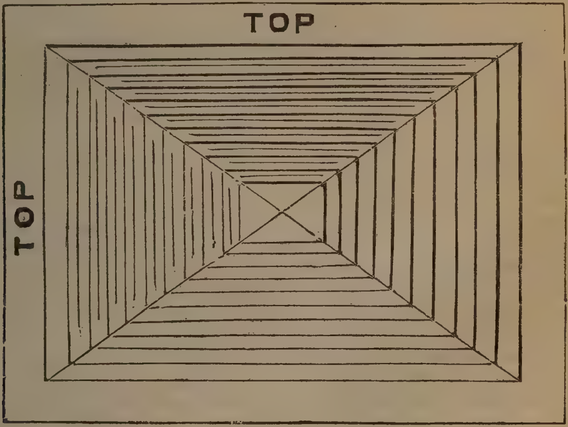
Should a negative that has been intensified and varnished be found to give hard prints, the varnish can be removed, and the operation of reduction performed in a similar manner. To remove the varnish, flow over the negative sufficient methylated spirit to cover it. Allow the spirit to remain for a little to penetrate the varnish. Drain on to a tuft of cotton-wool, then gently polish, so to speak, the face of the film. Once more flow with spirit, and clear off with a soft piece of clean linen rag. Afterwards immerse in water, when any gum still adhering is easily removed, and the negative ready to be reduced.

MOUNTING PHOTOGRAPHS, AND VENTILATING THE DARK-ROOM.

BY C. T. CHESTERMAN.

In the Year-Book for 1876, Mr. Viles explained a method for mounting, which is very convenient, and which (with the following modification) I have used ever since.

A piece of white American cloth or waterproof paper, slightly larger than the largest mounts used, is fastened on to a drawing-board with glue or paste (tacking the edges will answer as well; a guide mount will not do, as it cockles so soon). Upon this cloth trace lines as shown in the diagram, about half-an-inch apart, using a drawing-pen and indelible* ink. On the sides marked TOP, trace some short lines equidistant between the others; these are for placing the prints up to, so as to leave a wider margin at the bottom.



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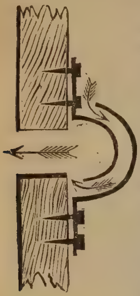
* Sold by Roberson, Long Acre; and most artist's colourmen.

With this board it is the easiest thing imaginable to mount various sized prints on mounts of one or several sizes. If the mounts are all of one size, lay one down in position, and mark the place by driving three steel pins into the board (two on the left side, and one at the top); now paste the back of a print, lay it up to the lines so as to get it square, press the edges of the mount up to the steel points, then press it gently on to the print, turn it over, and smooth down with a soft cloth or a folding knife, interposing a sheet of thin paper to guard the surface of the albumen. If the mounts are of various sizes, use, instead of the steel pins, two rulers of metal as guides to mark the position of the mount; then proceed as in the other case.



Dark-Room Ventilation.—While inspecting the enlarged premises of the "first Russian dry-plate factory," I was struck with the simple arrangement introduced by the proprietor, Herr Felisch, for admitting fresh air into the different apartments. Horizontal rows of holes, half-inch diameter, are bored in the doors, and two strips of zinc, bent thus ? are tacked over them so as to exclude the light. A piece of muslin glued over the holes, and damped with glycerine, intercepts dust particles.

THE INTENSIFICATION OF GELATINE-BROMIDE NEGATIVES WITH MERCURIC CHLORIDE AND SODIUM SULPHITE.

BY DR. J. M. EDER.

I HAVE frequently used the mercuric chloride and sulphite method for intensifying gelatine negatives, and can recommend the process.

The washed negative is placed in a solution of mercuric chloride, and allowed to remain a longer or shorter time according to the degree of intensification required. After this the plate is rinsed with water—a thorough washing being superfluous. To blacken the plate it is now immersed in a strong solution of sodium sulphite (say one part of the sulphite in eight or ten parts of water), and when the darkening has reached its maximum, the plate is well washed.

The special advantage of this method is the fact that there is no necessity to wash away all traces of the mercuric chloride before placing the plate in the sulphite bath, as mercuric chloride and sodium sulphite do not react upon one another. The white and insoluble mercurous chloride which is deposited upon the plate is, however, rapidly reduced to the metallic state by the sulphite. As metallic mercury forms a stable image, negatives intensified by the method described may be regarded as permanent; moreover, the colour is a very good one for printing, and there is but little fear of losing the more delicate shades of the subject from over density.

If the intensification has been carried too far, it is easy to reduce the negative by treatment with a very weak cyanide of potassium solution.

NEGATIVE VARNISH.

BY W. BEDFORD.

It was not long after the general adoption of the gelatine process that it was discovered that the varnish hitherto used for collodion negatives was not a sufficient protection in the case of gelatine negatives when large numbers were required to be printed. Minute spots first made their appearance, and these rapidly multiplied and increased in size until the negative became useless. Many methods of treatment were suggested and carefully tested as a protection against the caustic action of the silver salt on the film of gelatine; but suffice it to say that none was found to equal in efficacy a coating of collodion followed by another of spirit varnish; and, judging from subsequent experience, these substances, if properly applied, seem to be a perfect remedy for the evil.

A suitable collodion is made by dissolving a tough soluble pyroxyline, such as is used for surgical collodion, to the strength of six grains to the ounce in equal parts of methylated alcohol and methylated ether ·720. It is allowed to settle for some days; and the clear collodion may then be applied to the negative in the usual way. It should not, however, be drained off too closely, but should be allowed to flow back evenly over the surface, and the plate then placed on a level support until set. When dry, a thick impervious coating results, which is rendered hard and proof against ordinary risk of mechanical injury by the application of a lacquer prepared as follows:—

To half a pound of "button lac" and two ounces of sandarac placed in a flask, add half a gallon of methylated alcohol, and shake up occasionally during a week, by which time the soluble portion will be taken up; but do not use artificial heat to dissolve the sediment, as it is better filtered out. Button lac, although apparently browner than shellac, is recommended in preference, as it really gives a lighter coloured solution; but even seed-lac may be used if the precaution be taken after filtration of boiling the clear but dark-coloured varnish for ten minutes in a flask on a water-bath with four ounces of freshly-prepared animal charcoal, which treatment, followed by a second filtration, effectually removes the orange dye which would otherwise tend to retard the printing. The collodionized negative is warmed as usual before and after lacquering. Many negatives thus treated have been in contact with sensitized paper for several months at a time, and exposed in all weathers during the last three years without any apparent detriment; so it is hoped that this record may not be without some practical value.

WATER IN THE DEVELOPER.

BY F. A. BRIDGE.

In the old "collodion" days, every careful operator knew what great differences could be produced by varying the quantity of water in the developer.

In this advanced gelatine age, however, although innumerable variations are proposed with regard to the other constituents, and the most extreme proportions of pyro, ammonia, and bromide suggested, how few seem aware of the great difference in result that can be obtained simply by altering the quantity of water. In cases of over- or under-exposure, we are constantly told to increase this chemical, or diminish that; but, as a rule, the quantity of water remains the same. If, however, my photographic brethren will turn their attention to this question, as to the quantity of water used in the developer, they will be surprised at the result.

In cases of known over-exposure, use as much as possible; in cases of under-exposure, use as little as possible (soaking the plate first, that the small quantity may flow evenly); and by varying the proportion between these two extremes according to circumstances, many a negative will be saved, which, if developed under ordinary conditions, would be hopelessly ruined.

If, on development, the plate shows unmistakeable signs of over-exposure, throw the developer off as soon as possible, and soak the plate in changing water for a time, then start with a well-restrained watery developer. If, on the contrary, the picture is so slow in coming up that there is no doubt about its having been insufficiently-exposed, wash thoroughly, and use the developer in as concentrated a form as possible.

Just a word or two more. All stock solutions of pyrogallic acid are misleading as to quantity, and the weighing of this substance is troublesome. There is no occasion for either. When a bottle of pyro is opened, stir it well with a glass rod to break it up into powder. For a half-plate, measure (say) two drachms in a dry ounce measure, adding the water, and then turn it into the developing cup. Should the above quantity be found too little or too much for the make of plate, it is easy to use less or more. This plan merely entails the trouble of drying the measure after each plate, and the solution is always fresh and of the same strength.

A GOOD CHEAP CAMERA CASE.

BY C. F. PRITCHARD.

My camera case consists of a basket lined with thin mackintosh, and fastened by means of two straps passing right round it. The basket I had specially made for me to hold camera, lenses, dark slides, &c. It is very cheap (mine cost less than ten shillings for half-plate), light, waterproof, and thoroughly effective.

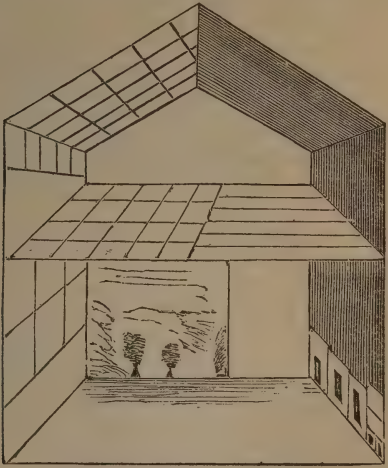
A NOVEL STUDIO.

BY A. BORLAND.

THE studio I am about to describe is not novel in respect of any advantages it possesses over other studios, but rather because it is a somewhat unusual adaptation of premises to render them available for photographic purposes, such adaptation being the almost direct outcome of the gelatino-bromide of silver process of making negatives.

My object in describing it is that such description may, perhaps, give a hint to other members of the fraternity who may be similarly placed in regard to premises at their disposal.

To commence with, I had two rooms, 24 × 15, one on the ground floor, and one over it. The upper one I required as a place in which to work a photo-lithographic process, and to that end I had one side of the roof replaced entirely with glass, and about 2 feet of the wall, situated at the lower end of the skylight, also replaced with glass.



The lower room I intended for occasional use in portraiture. I therefore had a large window placed in one side, the lower squares of glass being ribbed, so as to diffuse the light, and at the same time prevent sitters from being annoyed by people looking through.

With such a large side-light and suitable reflectors I expected to be able to do without top-light. On trial, however, I found the working to be very troublesome and somewhat slow, even with gelatine plates, and the best results not equal to my desires. Having spent a considerable sum of money in fitting the room, I felt loth to give up, and cast about for some means of overcoming the difficulty, and at last decided to take out part of the floor of the room above, and replace with thick glass, so that I might benefit by the light from above. I had the alteration made, and the result has equalled my most sanguine expectations.

The glass used is what is known as rough plate, and is about three-quarters of an inch thick. The roughness or waviness of the surface of the glass seems to help in diffusing and softening the light. In this case the glass is simply laid in between the flooring joists with sash bars at intervals to enable the glass to bear the weight of anyone walking over it. An improvement would be to have an iron frame, such as is used in shops and offices, in which case more light would be obtained, as the frame would be less bulky, and would also look better.

Anyone undertaking to get the work done in the same way that mine is done must be careful not to have the squares of glass too large, otherwise they will not bear the weight of a heavy person walking over them, and a serious accident may be the result. In my case the squares are 12 × 10 inches, and so far have borne all the weight placed on them with perfect safety.

I have thus been enabled to use a room that I could not otherwise have used with any reasonable degree of comfort or success, and this is altogether due to the gelatino-bromide of silver process, for I should not have ventured upon such an arrangement if I must have depended on the collodion process for portrait work. I trust the information here given may be of some service to others.

A HANDY TOOL.

BY JOHN HARMER.

Most photographers, and those in particular who have not quite abandoned the wet plate process, find it at times necessary to edge their plates, the usual tool employed for the purpose being a brush on a stick with a wire-guide, which is dipped into a bottle and applied to the edge of the glass. For small plates, where the brush holds sufficient to go round or to complete one side, the contrivance answers well; but for larger sizes it is both messy and inconvenient. These require some arrangement on the fountain principle, whereby the solution may continue to flow in the proper quantity as desired.

To provide a tool of this kind an old capped collodion pourer is pressed into service; and its inner neck being removed, into its place is fitted a hollow open tube of hard wood (a farthing needle case cuts down nicely) having its projecting end cut off obliquely to facilitate its contact with the edge of the glass. On one of its sides is secured, by means of fine wire or string, a piece of flat steel or wire to serve as a guide, and the tube itself is lightly plugged with a pledget of cotton-wool, or a camel's hair brush is wedged in. If the latter, a shallow groove or so must be cut in the interior of the tube to allow the passage of the liquid, which is distributed to the brush and prevented from collecting in drops by loosely stopping the top of the tube round the hair of the brush with cotton-wool as before.

A word is scarcely needed to explain its use, all required being to put the liquid into the bottle, press in the plug, and draw along the edges of glass. Keep the bottle capped when not in use.

ON CARRYING APPARATUS.

BY W. F. DONKIN.

The constantly increasing demands of tourists and others for light and portable apparatus have resulted in the manufacture of cameras, slides, tripods, &c., of wonderful compactness and lightness. They are fitted into elegant leather cases, and it seems at first sight as if nothing could be better arranged or more convenient for carrying. This is possibly the case when one has a hand to spare for carrying the tripod, and the ground is tolerably level, so that the case, slung by a strap over the shoulder, does not swing about too much. But on rough ground, especially when going up hill, the case has a way of swinging round in front, and one has to be continually pushing it back; and then the other hand soon gets tired of grasping the tripod, and a change has to be made, and the strap shifted to the other shoulder; and then, perhaps, one has to get over a gate or jump a stream, and either the strap slips off or the camera gives one a dig in the ribs, and on the whole one begins to think less enthusiastically about photography in wild and interesting scenery.

The fact is, that "portable" apparatus, as usually arranged, is far from being really portable. So far as lightness goes, such a combination as, for example, McKellen's new camera with Warnerke's new roller slide, could hardly be excelled; but the real meaning of the word portability is *convenience of arrangement for carrying.* There is no method for carrying weight for a long time, without fatigue, so good as that adopted in the army—namely, to carry it on the back as a knapsack. In hilly country, such as Switzerland, the natives carry everything on their backs, generally in long funnel-shaped baskets very wide at the top. The leather or canvas cases generally used for holding camera and slides would form very good knapsacks with a better arrangement of straps. The simplest way to manage this is to have a strong brass ring sewn on the top of the case; then, imagining the case to be on one's back, the strap passes through the ring, over the right shoulder, down under the right arm, under the case (through leather loops as usual), up under the left arm, over the left shoulder, and down again to the ring on the top of the case. The strap must of course be a long one, or two shorter ones buckled together will do. When the length is so adjusted that the case hangs rather low, the weight is well distributed on the shoulders, and a very heavy kit may thus be carried with less fatigue and inconvenience than in any other way. The tripod should be provided with a handle or strap in the middle, so that it may be carried, resting on the top of the knapsack and secured to the brass ring. That these are thoroughly practical arrangements, I can testify from several years' experience in the Alps. When I wish to ramble about alone, I carry in a leather case, measuring 16×12×5 inches, and weighing (empty) 5 pounds 4 ounces, a 7½×5 camera, four double backs, box of five lenses, focussing cloth, view meter, and shutter—total weight, including case, 19½ pounds, and on the top of this a Mawdsley's sliding stand in case, weighing 4 pounds. It is true that at first, with such a weight, a decided drag on the shoulders is felt; but it would be felt far worse anywhere else, and (in Switzerland at least) instead of increasing, it soon almost disappears, and one forgets all about it. When out for a long or difficult expedition, I carry a changing-box and slide and the lenses myself, in a light canvas case slung in the same way (9½ pounds), and make my guide and the porter carry the camera and tripod anyhow they like.

In conclusion, I would say, never sacrifice strength for lightness. It matters far less what weight you have to carry, than how you carry it.

A PLEA FOR THE 11 × 9 PLATE.

BY W. B. ALLISON.

For something brief, yet useful, asks the Editor. Therefore to my amateur friends who "intend going in for a large set of apparatus next year," I address myself.

My old friend, the 11 × 9 plate, was formerly a great favourite among amateurs. Why it should not be so now I cannot understand, for it has the following apparent advantages when one confines one's self to a particular sized photograph.

A sheet of sensitized silver paper, as usually bought, cuts into four 11 × 9 prints, with no waste; a sheet of platinotype paper ditto.

Carbon tissue cuts into three, transversely, leaving plenty of margin for the "safe edge."

An 11 × 9 negative gives a print almost as imposing in appearance as a 12 × 10; six plates are considerably lighter in weight, cost less money, and are covered by a smaller lens than necessary for 12 × 10.

NOTE ON THE POTASH DEVELOPER.

BY FRANCIS T. BEESON.

With many others, I have tried the above developer with commercial plates, and am pleased with the results it gives. One of its chief recommendations, and the one which most influenced me in adopting it, was the freedom from noxious and irritating fumes during development.

The sulphurous acid used in it, however, is very irritating and trying to the respiratory organs, before it is neutralized by the other ingredients of the developer, as I found to my cost when first mixing the developer, causing, as it did, shortness of breath and a nasty choking sensation.

As a moral, therefore, I would recommend all who use this developer to be careful to measure their sulphurous acid either out of doors, or in a room where there is a good current of air.

A NOTE WITH REFERENCE TO THE USE OF ARGENTIC BROMIDE PAPER.

BY J. PIKE.

Now and then, when working with this paper, stains occur, owing to some want of care in manipulation. The makers very properly urge the necessity for perfect cleanliness of fingers, dishes, &c., and the formula they give for a clearing solution answers very well its purpose. One stain, however, having a very disagreeable colour, and with a metallic lustre, I have up to a recent date always considered fatal; but I find that it may be got rid of by using a solution of hydrochloric acid one part, water thirty parts; while the print is still wet, remove to a piece of glass, and with the fingers, or a piece of cotton wool, apply this acid solution, rubbing well in. The stain gradually disappears. It is remarkable what an amount of rubbing the film will stand even with a stronger solution than this. When the stain has entirely gone, wash, then immerse in the fixing bath again. Wash well, and finish in the usual way.

A NEW DIAMOND-HOLDER FOR CUTTING GLASS.

BY ANDREW BOWMAN.

The peculiar sound emitted while cutting, "not scratching," glass with a sharp diamond, is not very audible if the diamond is rigidly held at its proper cutting angle. The line it cuts on the surface of the glass is then scarcely visible, and the quantity of dust produced by making the cut is next to nothing in amount, and glass of ordinary thickness so cut should part easily without producing splintered particles.

The accompanying diagram represents in a rough way the principle of a new diamond-holder, which, in conjunction with *suitable gauges,* is designed to enable manufacturers of photographic dry plates to cut down large prepared dry plates into smaller sizes with certainty, in almost total darkness if necessary, and avoid loss from breakage by bad cutting; and at the same time save those of the profession who use commercial dry plates from one annoyance—viz., the quantity of coarse dust and splintered particles of glass so frequently found imbedded in the films of the smaller sizes of dry plates, the direct result of bad cutting.

The instrument consists of a stem with the button *a* (fig. 1) screwed on its upper end, and the flat head A, in which the diamond is set, at the bottom. The stem passes through the piece B C, which is permanently attached to the guide D D by its lower end (B, fig. 2), which both serves as a fulcrum and a centre on which the diamond turns. The movable end (C) is made fast—when the diamond is set at its best cutting angle—by means of the milled screw (fig. 2), behind the arc *e*, fig. 1, inscribed from the centre (B). The spiral spring encircling the stem between B C raises the diamond clear of the base of the guide (D D), when the stem is released from pressure at the end of each operation.

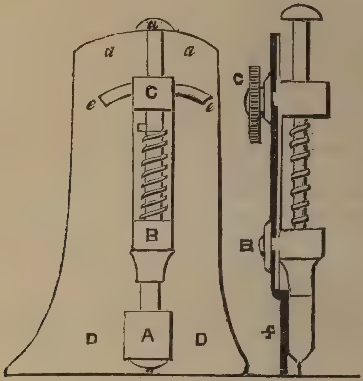


Fig. 1. *Fig.* 2.

Fig. 1 represents the diamond pressed down in contact with the glass. In fig. 2 it is raised by means of the spiral spring. The guide D D, which for lightness and rigidity is made of very thin sheet steel, shown in section by the broad black line, fig. 2, to make it more conspicuous, is bent in at F, so as to touch the flat head (A), and prevent it from turning round.

When in use, the instrument is held between the thumb and second finger, using the fore-finger to press down the stem of the diamond by means of the button, *a*. The base of the guide, D D, which is two inches long, being steadily held in contact with the surface of the glass along with the diamond, will effectually prevent the operator from cutting the glass at one part, and scratching it at another, by inadvertently raising or lowering his hand while drawing it towards his body, as he might easily do with the common glazier's diamond, working as he necessarily must in very dim red light while cutting very sensitive dry plates, and so reduce the loss by breakage to a minimum, and at the same time make sensitive films sprinkled with glass dust and splintered particles of glass a thing of the past.

ELECTRIC LIGHT IN DEVELOPING ROOMS.

BY J. D. ENGLAND.

For dark-room purposes the photographer will not require what electricians grandly term an "installation," which means a gas engine, dynamo, and all the other paraphernalia; but a light suitable for his purpose need not cost him much more than a sovereign and a little labour.

The present mode of lighting with oil lamps or gas is most inconvenient, and gives off much heat, and where daylight is used from the outside, it fluctuates too much.

The electric light has been proposed before; in fact, I have used it two years ago, but not having the proper form of battery, I found it troublesome and expensive, and the fumes not altogether pleasant. This difficulty can now be got over, according to what I am now about to describe.

In each of my plate-drying rooms, I have just fitted up a 2½ candle incandescent lamp shielded by two thicknesses of "golden fabric." The light thus given is quite sufficient to illuminate the room, even in the far corners, and is perfectly safe for a reasonable time. I have two large cells of Dale's granule batteries to each lamp; switches fixed to the door frames turn the current off or on. There is also an arrangement which, by means of a small block of wood on the door, pushes the handle of the switch to the "off" side directly the door is closed. It is certainly much preferable to gas light in dry plate work. It is cool, and always ready at a moment's notice; no fumes, as of course the batteries are outside, and moreover the electric lamps can be shielded by non-actinic medium much better than is possible with a gas light. I have not, as yet, had an opportunity ot testing how long the batteries will remain in working order. Two of the same kind of cells have been used for some time past in my establishment for driving a small electro-motor in the manufacture of emulsions, each battery lasting about a week, using it several hours per day; but as the light is only required for short periods, it is probable that the cells will not require re-charging more than once a month. The consumption of material is very small in these batteries, and are the best that I have tried for the purpose.

The medium that I use to cover the lamps—namely, golden fabric—is certainly a most excellent material. It gives a very bright light, and one may use what seems to be much more illumination with no more risk of fog to the plate than by using a yellow and ruby. The yellow medium illuminates the whole room more equally than the ruby; in other words, the ruby light does not seem to penetrate the darkness to such an extent as the yellow. Any other coloured medium with the yellow, except orange or red, is not to be recommended, as it cuts off a larger amount of light, and does not render it proportionally non-actinic. I may say that I tried to use a ruby chimney to shield the electric lamp, but found that the light given was very feeble.

THE LANDSCAPIST ON WHEELS.

BY BENJAMIN WYLES.

After about four years' use of the tricycle in view work, perhaps a few points have got themselves sufficiently driven home experimentally to be of some little use to others. The matter of primary importance I consider to be *strength* in the machine—the *pattern* is comparatively a matter of choice—but whatever the make is, unless it is strong, it is little likely to stand the addition of a considerable weight of apparatus. When it is only a question of carrying such a small affair as a quarter or 5 × 4 camera, the additional weight is trifling and may be ignored; but when the quantity mounts up to as much as a youth can fairly carry, it is another matter; and it is in carrying *heavy* weights that the machine becomes really useful. Say the photographer wants to get to a subject ten or a dozen miles away, if the road is good he will easily do it on the machine all the way; but if it's a "cobble" road, such as we know too well in Lancashire, if he can get within three or four miles of it by rail, he'll save time and strength in doing so by taking his things ready packed on the machine, which will then carry the four to six stones of "traps" and the operator into the bargain, landing him fresh on the spot and ready for work, where, if he had attempted to walk and carry his things, he would be exhausted before arrival. The great point in carrying weight is *balance*, and this brings me to the kind of machine used. I adopted Starley's "Salvo," a front steerer, and I have seen nothing to lead me to think any other machine preferable except in one small point—of which more anon. The weight and rider want to be so adjusted that the front wheel only just *touches the ground lightly—dances* along it; if the weight is so placed that the front wheel digs into the ground, the rider's own weight will be quite enough to tire him very soon without added encumbrances; but balanced as I have described, really does not seem to add much to the effort needed. The *attachment* of the apparatus is a matter for judgment according to the bulk and weight. A "camera carrier" is supplied for a few shillings, but I've discarded it, preferring to place the rather larger and heavy case nearer the ground, below the axle instead of above it, thus minimising the risk of an upset. The case is suspended by strong straps to the axle, and other straps at the bottom prevent "wobbling" and getting out of place. The one point in which a machine of this form is inferior to the form having a long side bar is the matter of packing the tripod. In the latter this bar is convenient for strapping tripod umbrellas, fishing-rod, and such things to. At first sight the "Salvo" form presents no such handy place. I used to have the folded tripod strapped in front of the chain guard at the left side, but fearing the result if it *should* happen to shake down and catch the road, I have found a far better place for it on the right side, between the steering arm and the wheel. It straps conveniently to the axle, and a fixed upright there is, to which the steering arm is attached. I admit it does not look as comfortable as the system of the long side bar; but it has served quite well, and the overwhelming advantage of balancing the weight in the front steerer puts the other practically out of court for weight-carrying. There is another form, the open fronted, with steering wheel behind. It should be known that the weak point of this form is its liability to capsize in descending steep gradients; the rider feels like being thrown out forward, and this, with heavy weight, is increased, unless the weight is borne chiefly by the small back steering wheel, and that seriously affects the running. What is wanted is to place the weight so that it is borne by the *large* wheels, and to keep it as near the ground as possible for safety.

After about four years' daily experience in riding to and from business, journeys of a score of miles, and errands about town; at one time a slide or two to expose in a near street; at another a load of apparatus carried up into the heart of Snowdonia in the face of a driving wind and rain, followed in the fine evening by the luxurious run down into Bettws with the feet up on the "rest" nearly all the way (experience as varied as wind, weather, and circumstances can make it), the honest verdict is that for the dispatch of business, for the gaining of health, for the taking of pleasure, the photographer has no such helpful appliance as a good tricycle.

WARM HYPO SOLUTION FOR GELATINE PLATES.

BY F. GULLIVER.

I HAVE been using lately, with much success, a warm solution of hypo for clearing gelatine negatives, and found it a great saving of time; and to produce clear and clean negatives of a good printing colour, just what is known as lukewarm is sufficient; and to make it so, it is only necessary to put the tray into the kitchen oven for a few minutes and the hypo solution in it. The negatives clear quickly—in fact, just after they are covered with the solution; and when well washed and put into the alum bath, a final wash of warm water will cause them to dry quickly.

I have used the above some months, and found no ill effects of so doing.

ISOCHROMATIC PLATES WITH CHLOROPHYLL.

BY FRED. E. IVES.

THE method of isochromatic photography, which I published in 1879, was so great a step in advance of anything then known, that my claims were regarded as too improbable to merit respectful attention, and I could not persuade anyone to give the method a fair trial. Writers continued to lament that "it was impossible," &c., and it was not until early in the present year, when Dr. Vogel claimed that he had just discovered the first and only completely successful method, that considerable attention was given to this line of research. Dr. Vogel was undoubtedly the first to suggest the use of dyes for increasing the colour sensitiveness of silver bromide, but he was not the first by several years to publish a practically useful process, nor has he, or any one else, ever published one equally as successful and valuable as that which I published in 1879.

After testing the recently-published processes, I once more called attention to my method in the PHOTOGRAPHIC NEWS, Sept. 5, 1884; and in order that its value may be readily appreciated I now contribute to the YEAR-BOOK two photo-typographic prints illustrating its remarkable capabilities. The subject selected is a highly-coloured chromo-litho. of a lady, wearing a bright scarlet hat with purple feather, a yellow-brown cape, and a dark blue dress. Having used a deeper yellow screen than is necessary, I have exaggerated the effect so that there can remain no doubt whatever of the capacity of the process to bring out the full values of all those colours which photograph too dark by the ordinary methods.

A characteristic of my process, which distinguishes it from all others, is the great sensitiveness of the plates to every part of the visible spectrum, which makes it possible to secure an almost endless variety of effects by simply changing the colour and intensity of the screens.

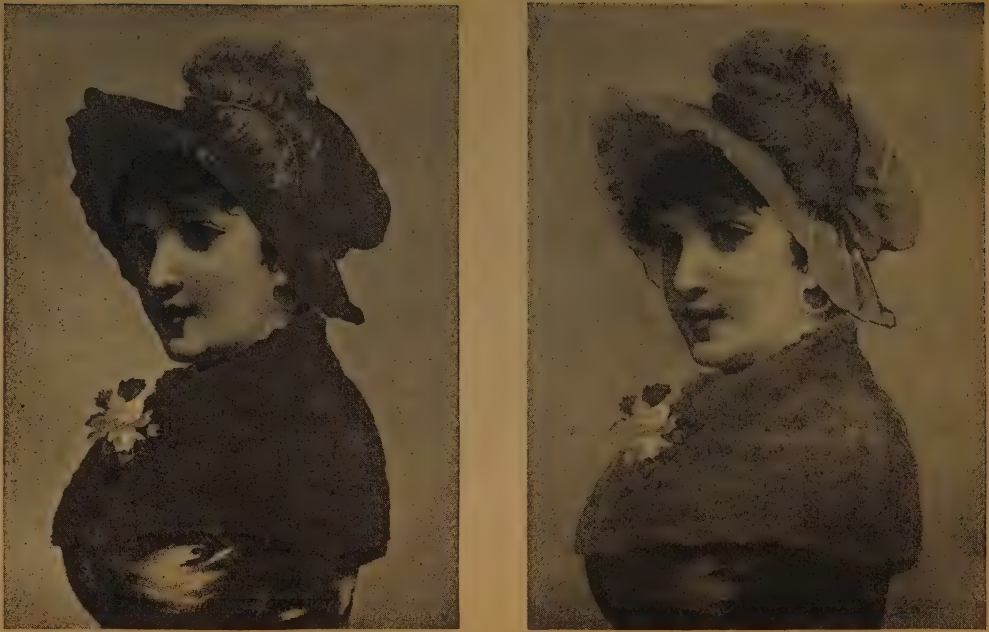
The process consists of treating collodio-bromide emulsion plates with the chlorophyll of "blue myrtle" leaves to render them sensitive to all colours, then placing a yellow screen in front of the lens to cut off part of the blue and violet light.

To prepare the chlorophyll, cut the leaves up fine, and cover with pure alcohol, heating moderately hot for a few minutes. It is most sensitive when fresh, but will keep good for some weeks in a cool place, protected from light. The leaves should be left in the solution, and the addition of a little powdered zinc appears to have a beneficial effect.

To prepare the plates, flow with collodio-bromide emulsion, and when set, cover for a few seconds with the chlorophyll solution, after which wash in distilled water until smooth. Great care must be taken to protect them from light during and after preparation.

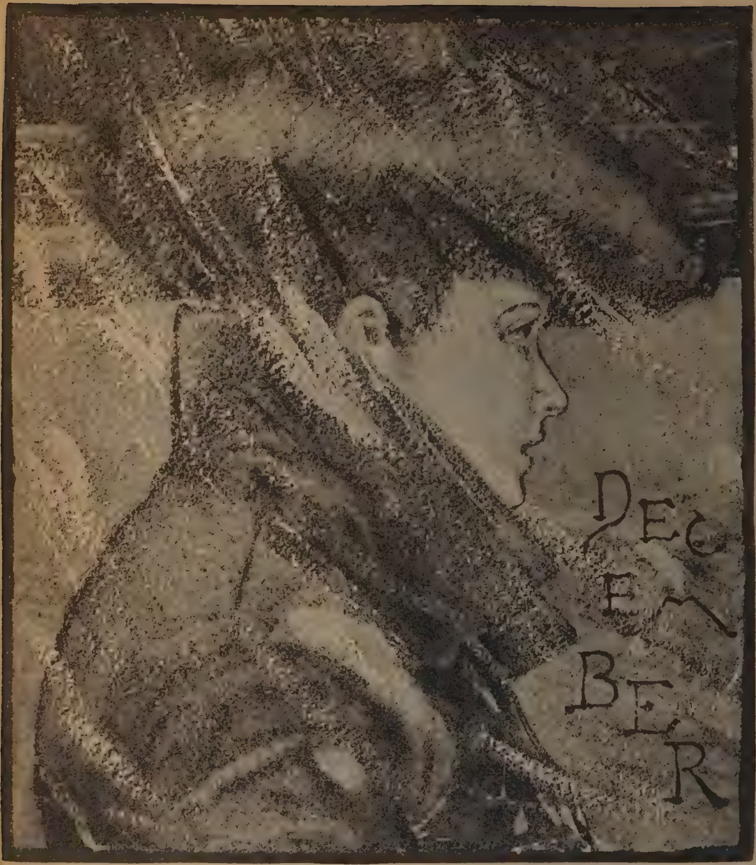
In front of the lens place a small tank having plate glass sides, and filled with a solution of bichromate of potash. If the space between the sides of the tank measures three-eighths of an inch, the bichromate solution may be of the strength of one grain to two ounces of water. If yellow and red photograph too light, the yellow solution should be made weaker.

Expose two or three times as long as would be necessary if there were no coloured screen, and develop with alkaline pyro developer. If the plates veil, add more bromide to the developer, and use less light in the dark-room. In very warm weather the plates may not work perfectly clear unless the chlorophyll solution is made a few days before the plates are prepared.



From Ordinary Photograph of Chromo-Lithograph. *From Isochromatic Photograph.*

IVES' PROCESS OF ISOCHROMATIC PHOTOGRAPHY.



ARTIST'S BRUSH DRAWING

REPRODUCED BY IVES' PROCESS OF PHOTO-MECHANICAL ENGRAVING.

CROSSCUP & WEST ENG. CO., PHILA., U. S. A.

Presented with the "Year-Book of Photography," 1885.

FROM WIDE-AWAKE'' MAGAZINE,
D. LOTHROP & CO., BOSTON.

PHOTOGRAPHY AND PHOTO-ENGRAVING IN MUNICH.

BY PROFESSOR H. W. VOGEL, PH.D.

Munich is *par excellence* an art town, and the capital which good king Ludwig sunk for art purposes has yielded abundant interest. Side by side with pure art, the various branches of applied art flourish in Munich, and more especially the reproductive arts. In Munich was lithography discovered, and here was reared, as a delicate child, the process of collotypic printing, a method nearly related to lithography. The great establishments of Haufstaengl and Bruckmann, where oil-paintings are reproduced, may also be mentioned; and also the more recently formed Meisenbach Company, at whose works photographs are transformed into blocks for the printing press.

When possible, I visit Munich each year in order to learn what is new, and this year I have learned much. Bruckmann has ceased to work the Woodburytype process, but in the place of this he is printing collotypes with six machine-presses; while the renowned collotyper of Munich, Herr Obernetter, still works with the hand-press, and confines himself to the production of the most artistic class of work. Still the newest thing at Munich is the photo-engraving process of Obernetter, a copper-plate method for the reproduction of subjects in half-tone; the results being similar to those obtained by Goupil. Obernetter calls the method "Lichtkupferdruck," and it differs widely from Goupil's process, as the latter consists in making an electrotype reproduction from a grained relief, an operation which takes some weeks; but Obernetter prepares his plates by etching, and this is an entirely novel method. He transforms a diapositive image on gelatino-bromide into chloride of silver, strips the film from the glass, and places it upon a copper plate. Under the influence of an electric current the chloride of silver is decomposed, the chlorine uniting with the copper, and etching the plate to a greater or less depth according to the thickness of the deposit of chloride; the result being a grained intaglio plate capable of giving the most delicately graduated impressions.

The process is remarkably rapid, and in my presence Obernetter stripped a picture from the glass, and in one hour presented me with a printing plate made from it. The method is therefore quicker than collotype; and, moreover, the plates can be printed from by any copper plate printer.

LANTERN SLIDES ON ALBUMEN.

BY TLIEU.-COLONEL W. L. NOVERRE.

In the production of photographic transparencies, the great difficulty has always been to obtain with certainty a thoroughly satisfactory colour. For uniformity in the matter of colour, no method can excel the carbon process, but for some reason amateurs seem to avoid it. The colour generally admitted to be the most pleasing is a dark, rich sepia brown, first produced, I believe, by Messrs. Ferrier and Soulier, of Paris, in their exquisite stereoscopic transparencies on albumen. As lantern slides from photographic negatives are becoming popular, I propose to give a brief account of this method of production, which is, I consider, unequalled for brilliancy, sharpness, beauty of colour, and certainty of result, while it is surely the most economical of processes. It further has the advantage that the development of the plate can be conducted in a bright yellow light.

Preparation of the Albumen.—Separate the whites from several eggs, remove the germs, and to every ounce of albumen add two grains of iodide of potassium; when this is dissolved the mixture must be beaten to a stiff froth, and put aside for several hours to settle; the fluid should then be decanted into a clean glass vessel. If bright and clear, it is fit for use; but if any particles are seen floating about, the albumen must be filtered. To accomplish this, a tuft of wet cotton-wool is pressed evenly into the neck of a glass funnel, and the albumen is poured gently on. It should run through quite clear; if not, the operation must be repeated.

Coating the Plates.—Ordinary cleaned glass plates are used; but if the printing is to take place by contact with the negative, the glasses selected should be the flattest procurable. There is nothing novel in the method of coating the plates. A small quantity of albumen is poured on a plate, and is guided over it with a glass rod. The plan of drying the plates is probably new to most photographers. A common earthenware pan is half filled with dry earth or sand, and on this a couple of handfuls of lighted charcoal are laid, the plate being dried over this in the following manner. A piece of thin wire is twisted at each end into a loop, and bent in form of a bow; the coated plate is supported by fitting two opposite corners into the two loops, coated side down, and the arrangement is suspended over the fire by a string held in the left hand, a whirling motion being given to the cord by the fingers of the right hand, which causes the plate to spin rapidly round; this throws off the surplus albumen, and the plate is evenly and quickly dried. The plate must not be overheated, or fine cracks will be visible all over the surface. The albumenized plates will keep for any length of time.

To Sensitise the Plate.—The operations of sensitising and developing must be conducted in a yellow light. Sensitising is performed in a dipping bath filled with the following solution:—

Nitrate of silver...	30 grains
Glacial acetic acid	30 minims
Water	1 ounce

It is a curious fact that the acid, instead of slowing the plates, rather increases their sensitiveness. An immersion of thirty seconds in the bath is sufficient. A creamy film must not be expected, the plate appearing but little altered by the action of the bath. The plates are washed, to remove the free nitrate of silver, and set up to dry. In this condition they will keep for several days.

The Exposure of the Plate.—A full exposure must be given in this process, or cold tones will result. As the plates are very slow, it is advisable to print the transparencies in a frame by contact, and not in the camera. An exposure of six or eight minutes in the shade may be required, and the employment of an actinometer, as used in carbon printing, is recommended.

Developing the Plate.—Development is performed by pouring the following solutions on the plate placed on a levelling stand, or in a glass dish, which should not be used for any other purpose.

No. 1.

Pyrogallic acid	2 grains
Citric acid	3 ,,
Water	1 ounce

No. 2.

Nitrate of silver	20 grains
Citric acid	60 ,,
Water	1 ounce

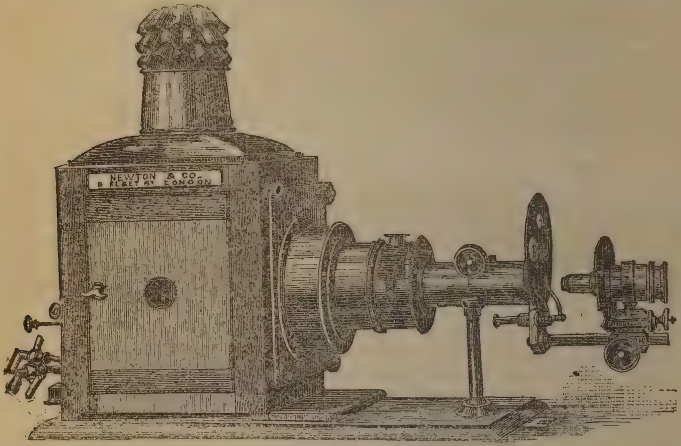
Commence the development with No. 1, and add a few drops of No. 2 now and then as required. With a properly exposed plate the development will be gradual and entirely under control. If the solution becomes turbid or discoloured, it must be changed at once. Any deposit that forms on the surface of the plate may be removed by gently rubbing with a tuft of cotton-wool. If full density is attained before the detail is all out, either the exposure has been too short, or too much silver has been added during development. If, on the other hand, when the detail is fully out, the density is insufficient, too little silver has been used. If, however, the development is skilfully managed and the plate properly exposed, full detail and density will be obtained together.

Fixing and Toning.—The remaining operations may be conducted by daylight. The picture is fixed in a solution of hyposulphite of soda made by dissolving 1 ounce of hypo in 5 ounces of water. After being thoroughly washed, the transparency must be toned in a saturated solution of bichloride of mercury; the plate is immersed in this till the whitening action of the solution ceases; it is then removed and thoroughly washed. The plate is next immersed in a solution of ammonia, about 20 minims to the ounce. In this the picture will gradually reappear, and must be carefully watched that it may not get too dark. For this purpose the plate may be removed from time to time, and examined by transmitted light. The colour should be a rich sepia brown. When the proper effect is obtained, the ammonia solution must be washed off under the tap, and the plate dried. The picture will darken slightly in drying, for which allowance must be made. These plates do not require varnishing. The use of mercury has been objected to on the ground that it induces fading. I believe, however, that the plates are quite permanent if properly washed after fixing, and again after removal from the mercury solution.

A NEW LANTERN-MICROSCOPE.

BY C. F. LAUDER.

Now-a-days the lantern or the lantern-microscope are important instruments of education or demonstration, and that manufacturers are quite aware of the many importances of the lantern is proved by the perfection to which the constructive details have been brought, and many readers will be interested in the following short account of the new lantern-microscope, which has recently been constructed by Messrs. Newton and Co., of Fleet Street, the plan and arrangement of the body or lantern portion of the microscope being the invention of Mr. Lewis Wright. The instrument is intended to be used on an ordinary lantern, or on the special lantern constructed for the purpose, and can be used either with the electric or lime-light.



A triple 5-inch condenser is used, which takes up the very large angle of 95° of light from the radiant. This light is then passed through an alum trough and a balsam layer to extract as much as possible of the heat, in order that the more delicate objects may be shown without risk, and the light is then parallelized and brought down by secondary condensers to illuminate a disc of the required size. These secondary condensers are either single, double, or triple combinations of lenses, according to the power of the objective which is to be used with them, and are inserted in a rack-tube to give the necessary adjustment of distance from the slide.

Any ordinary microscope objectives may be used with the instrument, but the best results are said to be obtained with a new series of lenses, most of which have been worked out by experiment on the screen, as it is found that many lenses which work well on the table microscopes, fail under the more delicate test of screen work. The especial objectives which are at present arranged for use with the lantern microscope are—

3-inch, 2-inch, $1\frac{1}{2}$-inch, $\frac{8}{10}$-inch, $\frac{6}{10}$-inch, $\frac{4}{10}$-inch.

and $\frac{1}{4}$-inch is preparing.

At a recent meeting of the Royal Microscopical Society, a number of anatomical and other subjects mounted by Dr. Carpenter and other Fellows of the Society were shown with the instrument now described, and some of the first microscopists of the day—as, for example, Dr. Dallinger, F.R.S. (President), Dr. Carpenter, Professor Stewart, Mr. Crisp (Hon. Sec.), and others—stated that the results were greatly in advance of anything that had been previously obtained.

At the Quekett Microscopical Society, a blowfly's tongue was shown from 6 ft. to 14 ft. long with the various powers, and a section of drone fly's eye was thrown on the screen, magnified 2,500 diameters, or, in more popular language, considerably over six million times. These results were obtained by the oxyhydrogen lime-light, at a distance of 25 feet from the screen. Of course, if the electric light is used, far larger results can be obtained, as the size can be increased in direct ratio with the increase in power of the source of light.

INDIA-RUBBER SOLUTION AS AN ADHESIVE IN COMBINATION PRINTING.

BY W. COTESWORTH.

Not having gum handy, I tried India-rubber solution for attaching the paper masks in combination printing, and found it of the greatest advantage.

1st. It does not expand the paper.

2nd. Not drying quickly, the mask can be moved about, and adjusted with great accuracy.

3rd. In case of the mask having to be removed, it can be lifted by careful insertion of a paper knife without damage to it or the negative.

CHANGING BAGS—A SUGGESTION.

BY HERBERT S. FRY.

So many plans have been brought forward for changing plates from and into double dark slides, that one hesitates to suggest another. Here, however, is one which, at any rate, has the advantage of extreme simplicity, and moderate cost.

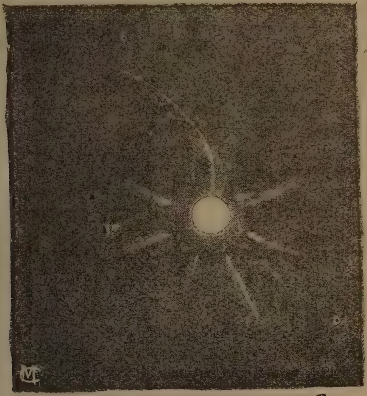
It occurred to me, while changing plates under disadvantageous circumstances at a country hotel, that a large light-tight bag, big enough to go over the head and shoulders, tying round the waist, and with plenty of room for the arms to move and change the plates and slides, should be made. Plates of any size could then be easily changed without fear of white light reaching them (in fact, the packet of plates need never be taken out of the bag), which would serve as a useful wrap or focussing cloth, and *could be made at home at a trifling cost.*

PHOTOGRAPHS OF FIREWORKS

BY JOHN G. HORSEY.

HAVING received an invitation to witness a display of fireworks at a friend's house, I resolved to try what effects therefrom could be obtained on rapid gelatine dry plates. It was a dark night in the month of November two years ago. Having filled my changing-box with the most rapid plates then to be obtained, and taking a Ross' rapid symmetrical lens, I soon found myself on the scene of action. A goodly company had assembled, anxiously awaiting the advent of the pyrotechnist. I soon had an opportunity of arranging with that gentleman for a negative of our audience by the aid of a very brilliant "light" (of which I forget the name). I used two plates with very good results, the features of the visitors being easily recognized with an exposure of thirty seconds. Then commenced the exhibition. Choosing the brightest and whitest of each kind displayed, I expended two plates with exposures respectively of ten and twenty seconds (always using the largest stop).

the latter in every case proved the best negatives. The two chosen for illustration are from among them. It will be noticed that in the one somewhat resembling a Prince of Wales' Feathers, there is, close around the centre, a circle of slightly darker shade; this was of a red colour in the firework, as were also the extremes of the shooting arms or feathers above it. I was for a time puzzled to account for the snake-like marks about the left lower corners, but eventually came to the conclusion that they represented the lighted "port fire" moved about by the operator during the burning of the device.



I do not think fireworks have before received the attention of the photographer, so these may prove of interest to the readers of the YEAR-BOOK. If such results can be obtained from so simple an exhibition, what might not be got from such extensive fields of blaze and light as we witness each summer at the Crystal Palace?

ON THE USE OF THE ACCUMULATOR FOR PHOTOGRAPHIC PURPOSES.

BY A. J. JARMAN.

When portraits are taken by the electric light, and the current employed exceeds twelve ampêres, it is generally produced by the direct working of the dynamo electric machine, which involves the use of a six-horse power gas engine, or thereabouts; and if such a powerful light as 6,000 to 8,000 candle power is required constantly, the employment of the above power (gas engine) is necessary; but if a light of 6,000 candles is only required just at the time of exposure of the above-mentioned intensity, then a one-horse power "Otto" or Clerk's gas engine, with a suitable dynamo machine and a set of storage batteries, will answer the purpose just as well as a six-horse power engine and a large dynamo. The one-horse power engine can produce a light direct from the dynamo equal to about 2,000 candle power, and the accumulators having been charged by means of the small dynamo, are capable of supplying the remainder of the current to produce a light of 6,000 candles. A small dynamo, a one-horse power gas engine (or steam engine, if desired), a set of twenty-six cells to constitute the accumulator will cost considerably less than a six-horse power engine and a large dynamo; and, what is more, should a light of 12,000 candle-power be required, it can readily be obtained when the accumulator is employed; it is readily arranged by a suitable cut-out placed in the circuit of the lamp and main lead. The writer has many times produced a light equal to 12,000 candle-power by the above means, or 6,000 and 2,000 at will, just as he required the above variable intensities.

With a suitable ammeter, or electro-dynamometer in the circuit, the quantity of current flowing through the arc lamp can at all times be accurately known, and consequently the intensity of the light. When the dynamo is working direct upon the lamp, the current flowing will be ten ampêres to give a 2,000 candle-power arc light. As soon as the charge is allowed to flow into the same leads, from the accumulator, through a suitable resistance coil, the instrument will show thirty ampêres flowing; this intensity of current will give a 6,000 candle-power light. When the full force of the accumulator is put on the main leads by cutting off the resistance, then a current of 60 ampêres will be shown to be flowing, and the result will be a light of 12,000 candle-power. The intensity of the above light cannot at all be imagined. The writer has exhibited the above intense light on several occasions to visitors produced in the way above stated, which has made the noonday light appear feeble by comparison, while prints upon photographic paper have been obtained in a few minutes. When the photographer has such a means as the above at command, he is not only quite independent of sunlight, but has a range of intensity of light for any purpose in photography to which the electric light can be applied.

DEVICE FOR MAKING PHOTOGRAPHIC EXPOSURES IN THE DARK ROOM.

BY F. C. BEACH.

WITH the introduction of bromo-argentic gelatine paper for copying and printing purposes, improved devices have been required for making short and rapid exposures. Several plans suggested themselves to my mind, but the one which I herewith describe was that which I adopted as being both rapid and simple. On working a large number of gelatine prints, it was important that there should be no delay, as might be occasioned by the necessity of opening the dark room door for the purpose of making exposures to actinic light. My device is constructed to avoid this difficulty, and with it exposures can be made while the development of other pictures is going on in the dark room.

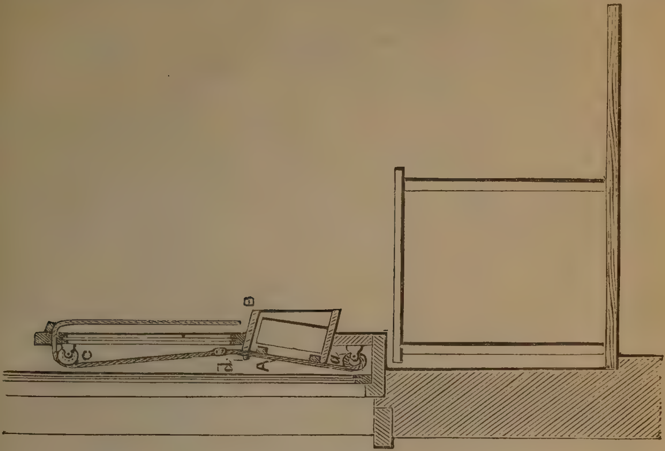


Fig. 1.

Fig. 1 represents a side elevation.

Fig. 2 represents a front elevation.

Fig. 3 represents the device adapted for use by artificial light.

B is a permanent wood frame set obliquely in, and forming part of, the non-actinic light sash frame, which is set just behind the outer sash.

A is a cotton blind or curtain of double thickness painted a non-actinic colour—such as a deep orange ruby, or it may be black—which is open at the bottom, having its ends secured by narrow strips, as shown in fig. 2, to an ordinary spring roller; *a—d* is a metal wire guide which holds the curtain light-tight against the frame B. The top of the curtain is kept flat and straight by the usual blind stick.

A cord, *c*, secured by a screw eye to the blind stick, runs up over a pulley, through a hole in the sash frame to the inside of the dark room. A knot made in the cord at the right point prevents the curtain from going down too far, and holds it in the position shown in Fig. 1.

The operation is simple, the printing frame being inserted in the frame B, making a close fit, as shown in Fig. 1, the glass side being towards curtain A.

The cord *c* is pulled down quickly in the dark room, which brings the open portion of the blind *A* in front of the frame, exposing the latter to actinic light, which enters through the outer sash. Upon releasing the cord *c*, the spring roller *a* and the force of gravity pull the blind A rapidly back. The exposure can be made in a second, and sometimes shorter.

On Fig. 3 is shown the same construction, except that in place of diffused day-light is substituted an oil lamp, between which and the blind A is located a sheet of ground glass, D. Such an arrangement is useful in making transparencies at night, as the same light will partially light the dark room and furnish light for the exposures. Different sized kits may be made to fit the frame B, and thus accommodate different printing frames.

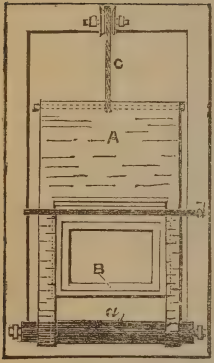


Fig. 2.

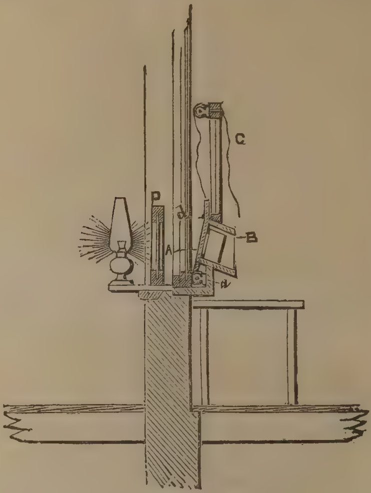


Fig. 3.

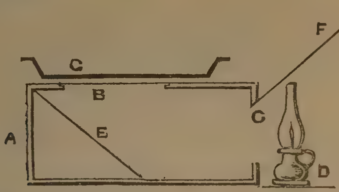
A table or shelf is conveniently arranged in front of the window, which permits the printing frame to be easily handled. The device has been in practical use for a long period of time, and has never become deranged. Its efficiency has been proved, and I commend it to all who have occasion to make rapid exposures.

AN ILLUMINATED STAND FOR THE DEVELOPING-DISH.

BY J. HOWSON.

A, box with opening in lid, covered with ruby glass, B.
C, open end with ordinary lamp, D.
E, mirror set at proper angle to reflect light from D, up through B.

A negative in the glass dish, placed on B, can be watched without removing it from dish.



F, screen, to keep off rays from lamp.
G, glass dish containing developer.
The lamp may be a dark room lamp, and B plain glass.

ON THE PERMANENCY OF ENLARGEMENTS ON GELATINO BROMIDE PAPER.

BY WM. BROOKS.

I ALWAYS was under the impression that if some protective medium could be applied to the surface of the developed prints to protect them from atmospheric influences, it would greatly add to their durability, from the very fact that of spoiled gelatine plates placed upon shelves, some show deterioration if left unprotected by a varnish of some kind; and lately I have seen several instances of fading of enlargements, which I am sure might have been prevented by very simple means. It also applies to collodion enlargements on paper. With ordinary prints on albumenized paper, the so-called encaustic paste is a very great protective agent. I have some prints printed over fifteen years that were so treated, and they are as perfect as on the day of their production; but of course I should not suggest that encaustic paste would be suitable for these enlargements, as all enlargements require to have a matt surface to be artistic. The plan that I propose will give a very fine dead surface, without any drawback that I am aware of.

I am aware that many of the gelatine arrangements are worked up in chalk, &c., and can be treated after being worked upon without fear of damage; anything to be applied with a brush would be out of the question. First take a good clear sample of pure white shellac in alcohol, and add to it an equal bulk of a saturated solution of borax in water, adding a little at a time, and shaking. If properly made, it will remain perfectly clear. This can be kept as a stock solution. If one part of the above stock solution is added to five or even ten parts of water, it will be found sufficiently strong for the purpose, and it can be diluted without any precipitation of the lac. Lay the enlargement on a table, and blow over the surface with one of the spray producers, either worked by the mouth or india-rubber ball; the surface becomes wetted all over without even disturbing any work that has been placed thereon by crayon or other means; it then only remains for it to be allowed to dry, and it is finished. The stronger this solution can be used, the more protective becomes its influence, and the little trouble it is, need not be taken into consideration.

COLLOTYPE FOR AMATEURS.

The Method of Mr. Riley.

To make a collotype plate that will give perfect impressions, proceed as follows:—

First, the substratum for the plate.—Take 1 ounce of ordinary dinner ale, 6 or 8 drops of silicate of soda, and well shake into a froth in a bottle, stand it by for twenty minutes, then filter. Take a clean glass plate (patent plate is best), and with a camels' hair brush go over one side of the plate; set on end to dry. When dry, go over the plate again, letting it dry this time the other way up. When again dry, let a gentle stream run on it for thirty seconds then again dry on end. When again dry, you may coat with the following solution:—44 grains Nelson's ordinary gelatine soaked for quarter of an hour in cold water, then heated in the oven till all is melted. Then pour into it the following hot solution:

Water...	½ ounce
Bichromate of ammonium	6 grains

Well mix, and filter. On no account let the solution get to boiling point. Take an 8 by 5 plate with the dried substratum on it, and flow over it ½ an ounce of the hot gelatine solution; place at once on the levelled glass in the drying box. It should dry in two hours, and is ready for instant use. Expose under an ordinary negative for an hour, then wash in cold water for 1½ hours, and dry in the open air, which takes from four to six hours, according to the weather. When dry, damp with very weak glycerine and water, allow the moisture to slightly evaporate, roll as above mentioned, and take impression off at once.

The drying box is as under:—20 inches high, 12 inches square, the levelling glass about 6 inches from the top of the box, three sheets of loose blotting-paper lying on it for the plate to rest on, a piece of iron (say) 6 by 4 by 3 heated in the fire, and placed 6 inches under the levelling glass. There should be at least three or four holes at the bottom sides of the box, and three at the top, to promote a good draught. The heat in the box should be about 120° F.

GELATINO-BROMIDE ENLARGEMENTS ON OPAL, ETC.

BY W. T. WILKINSON.

Direct enlargements on opal in collodion are much used for the cheaper class of coloured or black and white work, but in dull weather they require so long exposure in the enlarging camera as to render their production tedious and uncertain, except in the hands of an operator doing nothing else. To remedy this long exposure, and enable a reasonable amount of work to be done during the dark weather, gelatino-bromide must be substituted; but as the price of opal plates covered with the sensitive film is necessarily high, few photographers care to undertake their use.

Now by the method to be here described, any photographer may, with ordinary care, prepare his own opal plates; and as they are coated and then used wet, no elaborate drying arrangements are required. The formula for emulsion that the writer has found to yield splendid results is as follows :—

First of all procure a hock bottle, and place in it—

Water	10 ounces
Ammonium bromide	150 grains
Ammonium iodide	20 ,,
Ammonium chloride	50 ,,

Dissolve, and add sufficient hydrochloric acid to render the solution just acid to a strip of blue litmus paper; now add 100 grains of Nelson's gelatine No. 1, and place in a pan of cold water ; put the pan of water upon the fire or a gas-stove, and gradually raise to boiling point, by which time the gelatine will be found to be all dissolved; then add 450 grains of nitrate of silver in crystals, and shake vigorously until all the silver is dissolved, when the result will be a finely divided emulsion. Now replace the bottle in a pan of hot water, and boil for half an hour; at the end of that time add 400 grains of Heinrich's gelatine, previously soaked in 5 ounces of water, pouring in the water (if any) that the gelatine has not soaked up. When the whole of the last addition of gelatine is dissolved, pour the emulsion into a clean half-plate porcelain dish (a cheese or dessert plate will do) and leave it to set.

When set, squeeze through muslin or fine canvas (previously well washed) into a tolerably large jam pot; tie over it a piece of muslin, then attach to tap as per illustration on page 107 of YEAR-BOOK for 1884, by F. W. Treadaway. The washing will occupy about half-an-hour to an hour. When washed, place the emulsion in a piece of clean muslin, and squeeze as much water out as is possible, then re-melt.

Polish your opal glass same as you would an ordinary glass plate, except it be dead smooth, in which case soak in acid water; then scrub with common salt, and wash thoroughly under the tap; then stand upon a rack to dry.

Now, having re-melted the washed emulsion, strain through muslin, place the opal upon a levelling stand, pour upon it a little of the hot emulsion, and by means of a glass rod proceed to spread it all over the plate; then allow it to remain on the stand until the gelatine is quite set, when the plate is ready for exposure. After exposure, develop with ferrous oxalate, and fix in the usual way.

As well as making enlargements upon opal for reflected light pictures, they may be used as transparencies, and by using an open enlarging apparatus instead of a camera, erratic sizes of plates to suit the size of windows, &c., may be used.

To return to the opal enlargement. If the picture is upon a piece of ordinary opal, when dry it may be covered with a coat of matt varnish, to give the requisite tooth for working upon. It may be mentioned that if the above emulsion be diluted one-third, it may be used for enlarging upon canvas, the canvas merely requiring to be washed with dilute carbonate of soda to free it from grease; then coat with the emulsion by pouring it over same as collodion, and coaxing it over with the little finger (the canvas, of course, being upon its stretcher). Do not aim to get a thick film of emulsion, but drain as closely as possible, and hasten the setting by waving it to and fro in the hands. When set, expose, then remove the canvas from the stretcher, place it upon a flat board (face up), and form a tray by turning up the edges of the canvas, and pinching the corners with American pegs; develop with ferrous oxalate; wash, and fix by pouring the solutions carefully in and out of the tray, so as not to wet the back of the canvas.

When fixed, float the canvas face down upon frequent changes of water; then float upon a saturated solution of alum for thirty minutes, and again float upon clean water; then hang up to dry, and the resulting picture will be found to stick very closely to the canvas, and to offer a very good surface for painting upon.

PHOTOGRAPHY AT THE ANTIPODES.

BY C. W. NEWLING.

I HOPE a few photographic remarks from an Australian may not be out of place. I believe every photographer is prone to a little dodging; indeed, I have a few dodges of my own, two of which I shall be pleased to recommend.

On my lens I have a hollow globe with two holes which just fit the lens. The globe is painted inside with a dull black, to avoid reflection. I find this the best lens screen of all I have tried; and as I use a pneumatic shutter inside my camera, it is not at all inconvenient. Try it.

Another, simple yet effective. On the point of sight in my studio I have two cards. No. 1 is a pleasing photograph of a young lady, which is turned towards the sitter during posing. No. 2 has on "Quite ready, your best expression," with a cunning looking little dog in the corner. When I am ready to expose, I turn on No. 2, and the desired expression is generally forthcoming. I have other similar cards humorously got up, which, if judiciously used, I am sure would give satisfaction to any one who would give it a trial. I have tested it myself with good results. My average number of sitters per day is 50, I have had over 100. I do all the operating and developing myself. I develop eight cabinets at one time, which I find I can manage as well as one; and

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this saves me a lot of dark room work. The developer I use is my own, which I find will work well with all plates if the right proportions are used; and this can easily be determined by experience. This developer remains unchanged in either stock or dilute. Here it is:—

No. 1.—	Pyro	1 ounce
	Sulphite of soda	1½ ounce
	Sulphuric acid	2 drachms
	Water	10 ounces
No. 2.—	Liq. ammonia	14 drachms
	Amm. brom.	3 ,,
	Potas. brom.	4 ,,
	Water	10 ounces

To 1 ounce of No. 1 use 10 ounces water. To 1 ounce of No. 2 use 10 ounces water. Develop with equal proportions. Use two-thirds of No. 2 to commence until the detail is fairly out, then add the other third if necessary. This developer gives negatives not to be surpassed

Jottings.

How much chrome alum is it well to add to an emulsion? Here we quote Mr. Sebastian Davis: "Less than one-eighth of a grain to the ounce is seldom much use, and more than a quarter of a grain generally serves to make the gelatine too insoluble for easy re-melting; but of course something depends on the quality of the gelatine itself."

By noting the thermic results obtained with his sun motor, Captain Ericsson has come to the conclusion that the heat of the solar surface cannot be less than 3,060,727° Fahrenheit; and it may be mentioned that the highest temperatures which have yet been realized in the laboratory are so trifling, as compared with this, as in no measure to support the mind in attempting to grasp the idea of such a degree of heat. There appears to be no reason to doubt the general accuracy of Captain Ericsson's conclusions.

To make a dark room window, Obernetter colours a two per cent. collodion with turmeric and Jalap resin, and pours this on plain glass. Another way of making a medium is to make up a mixture of gelatine and turmeric, and to coat glass with it. The above are recommended for use with Vogel's azaline plates.

Persons who live by their wits should have good memories. Some time ago a tall, gaunt, shabby, slightly-rubicund-nosed individual called upon a well-known photographer, and told a long tale, how he was a colourer of photographs, and how, through a long illness, he had lost his connection. It wasn't money he wanted so much as work, although he threw out a hint that he hadn't tasted food that day. The photographer, willing to lend a helping hand, gave him sixpence and a carte to colour, telling him that if he did the work well, he could have constant employment. The man was overwhelmed with gratitude, and promised to bring the carte back the next day. A month went by before the "colourist" made his appearance, and when he did, it was to go on the same yarn about his destitution and inability to get work.

"But," said the photographer, "where is the photograph I gave you to colour a month ago?" "Did you give me one to colour, sir?" "Of course I did." "Oh, I beg your pardon, I'm sure. *I quite forgot I've been here before, or I wouldn't have called!*" And he walked out quite undisturbed.

The latest novelty in photographic albums—if album it can be called—is a series of plush-covered frames, fixed on one side to a common centre, and opening like the leaves of a book. This is made to hang on a wall, and forms a very effective and novel drawing room ornament.

Painting portraits on silvered glass—in fact, on an ordinary mirror—is a Royalty-honoured fad of the present day; but few photographers know how well a carbon print looks if developed on the surface of a looking-glass.

In making the carbon print it is advisable to avoid wetting the back of the glass—a very easy matter to arrange, if care be taken. As, however, it is necessary to cover a picture of this kind with plain glass, it is an excellent plan to make the carbon print on the plain glass, and then to mount this glass over the mirror; the picture being between the two. This mode of working does not necessitate the use of a reversed negative.

Those who have been troubled by the deterioration of plates where in contact with the packing paper, or even near it, will be interested in knowing that Mr. H. J. Newton, of New York, has found sodium hypcsulphite in samples of cardboard and paper which damaged plates. A grooved box made of cardboard containing hypo, ruined plates in the course of eight months. It is clearly the duty of plate makers to give attention to these matters, as original packages of plates are often kept for months before being used.

How, then, should plates be packed? Mr. Newton not only asks this question, but endeavours to answer it; his own recommendation being either to use grooved tin boxes, or to keep the plates separate by means of cord or string, after the fashion of Mr. Harrison

Curiously enough, those who devise clever methods of keeping dry plates from contact with each other, assume the need of separating the plates. If, however, they are simply laid on each other, so as to form a solid block, and tightly wrapped up so as to preclude all possibility of any grinding action taking place, it is a very rare thing for the films to be damaged during a journey, and the probability of mischief from impurities in the packing material is reduced to a minimum.

Occasionally the surface of a gelatino-bromide negative is so smooth as not to be marked by the retouching pencil. In such a case it suffices to dip the plate in a solution of sodium silicate and allow it to dry. One part of the dry silicate in thirty of water, or one of the thick syrupy silicate and twenty-five of water, gives a solution of convenient strength.

A photogrrapher, staying at a watering-place on the East Coast, was much struck with the picturesque costumes of the fishermen, and arranged with a couple to make a series of studies. But he omitted to lay especial stress on the fact they were to come in their work-a-day dress, and he was aghast to see two brawny fellows appear with clean faces, well-oiled hair brushed neatly into the corners of their eyes, flaunting blue and red satin neckerchiefs, and ordinary—very ordinary—coats and trousers. The worst of it was, the poor men were quite disappointed to find they were not to be photographed in their Sunday clothes! Why anybody should want pictures of them in their fishy jerseys and oilskin sou'westers they couldn't understand.

Writes Mr. H. Brain: "Why should not makers of dry plates cut off the top right-hand corner—the coated side being towards the operator? It would then be perfectly easy to fill the dark slides without any light at all, and a mistake would be impossible." We may add that a flat-nose pliers will crush the corner of the plate very easily and effectively, and as dry plate dark-slides are made with a rabbett, and not with wires, to support the corners of the plate, Mr. Brain's suggestion to remove an angle would not jeopardize the steadiness of the glass in the frame.

Speaking of albumen, *La Nature* enumerates three efficient ways of preserving eggs:—1. In a lime mixture, made up of 100 grammes of slaked lime and 10 grammes of sugar, diluted sufficiently with water to cover 250 eggs, which should remain immersed for a fortnight. 2. By covering the eggs with a film of wax or grease, gum-arabic, plaster, &c., and then rubbing them over with pulverized charcoal, care being taken to let the eggs rest points downwards. 3. By laying the eggs in a mixture of salt and bran, or sand and charcoal, in layers upon straw.

The same authority also tells us that bad eggs may be "restored" by making use of sub-nitrate of bismuth, or hydrated peroxide of iron, to absorb the sulphur that exists in the sulphuretted hydrogen of decomposed eggs.

We have seen a photograph of "London and four miles round" in the form of a transparency, small enough to go into one's waistcoat pocket. Furnished with this, and a pocket magnifier, the stranger has the whole of the metropolis literally at his fingers' ends.

An optical photometer which has been successfully used, it is said, for determining the exposure of dry plates has been submitted to the French Academy of Sciences by M. Edmund Becquerel. The photometer is the invention of M. L. Simonoff, and in principle it is very simple. It consists in narrowing an aperture through which the light falls upon a transparent screen. This screen has figures printed upon it, and smaller and smaller diaphragms are used until these figures are just barely readable. The aperture through which the light is permitted to fall is circular, and of course the smaller the aperture employed—necessary to read the figures—the more intense, obviously, is the light at hand; in fact, the luminous intensities are inversely proportional to the squares of the diameters of the apertures.

The Simonoff photometer is constructed in the form of a telescope. At one end are a series of movable diaphragms of different diameters, just like many of our lenses have; the other end of the "telescope" the observer looks through. If he wishes to test the intensity of daylight, for instance, he simply holds the instrument to his eye, and looks up at the light. The transparent screen is fixed in the middle of the "telescope," and the light coming through from the other end allows him to read the figures or letters printed on this transparent screen. Keeping the instrument to his eye, he revolves the diaphragms until he can scarcely read the characters upon the screen; the smallest aperture he has used is then noted, and this tells him the intensity of the light. A sheet of opal glass between the aperture and the screen diffuses the light uniformly. Altogether, it is a most simple and ingenious instrument, and, if practically useful, will be of the greatest benefit to photographers.

Anything from Mr. Ackland as regards the influence of the dark-room work upon the eyesight is of especial value. He says:—"The healthy eye can focus itself to objects as near as eight inches, and from this to an infinite distance; but the eyes of one who works much in the modern dark-room gradually lose the power of adjusting themselves to circumstances." Let us hope that the system of using greenish-yellow light, as recently advocated by Mr. Debenham, will lessen the evil. The shock to the eyes on entering and leaving the developing room is far less severe when the greenish-yellow light is used, than when ruby light is employed.

At Paris, M. Auguste Petit was attacked by a tigress which he was photographing, and severely wounded; still he persevered in his work, and not only secured a picture of the enraged beast, but also photographs of several lions and leopards—M. Petit and his camera being inside the den in every case!

In some of our big dry plate establishments, the *personnel* never quit the yellow-ruby light from eight a.m. to eight p.m., working and taking their meals in the dim illumination. This, it is alleged, is far less trying to eyesight, and more conducive to health, than going into white light periodically during the day.

"Why should not the professional photographer whose mainspring of action is a true love of his work, be called an amateur?" asked the late Mr. Jabez Hughes recently. "The term amateur," continued Mr. Hughes, "should not be used as if it were necessarily opposed to 'professional,' but should be considered as equally applicable to professional photographers and to non-professionals."

Masher: I know all about photography, don't you know, so just take me as I stand. Now can you see my elbow where you are? *Photographer*: Yes, sir, perfectly. *Masher*: And look here, don't you know, I want the collar and eye-glass to show all right. *Photographer*: I understand. Steady—done, sir. *Masher*: Done, is it? Ah! but look here, you know, are you sure you have taken the best side of my head? *Photographer*: Quite sure, sir; the outside.

The photographic tourist will thoroughly appreciate any simple means calculated to warn him of any dark-slide or other plate receptacle having been opened; and a long narrow strip of gummed paper with the owner's name written upon it has been proposed as a convenient and satisfactory seal; but when ordinary ink or lead pencil is used, such a strip can be easily removed, and replaced, if carefully damped, without telling the tale. The remedy is to employ copying ink, or one of the new copying pencils (made up with aniline colour), as the blurring of the lines will then be a certain consequence of moistening the label.

The *Archiv* tells us that on the Boulevard St. Michel, in Paris, a photographer does a thriving business in printing photographs upon the skin of his customers. Young women who wish never to be separated from the portraits of their lords are said to come frequently to the studio to be impressed by the loved one's features. The impressions, we are told, are produced with printer's ink upon the skin, but unless some mode of fixing were resorted to, they would not last very long. Surely it would be more romantic to produce ordinary silver prints, which would stand washing, and last twice as long; no love-sick maiden would mind the time and trouble involved in the process.

The statuette portrait—or, in other words, the white bust portrait on a pedestal—seems to be popular at Brighton, for we saw some excellent examples the other day at the studio of Messrs. W. and A. H. Fry. At first sight the pictures appear a little *décolletés*, but this is simply because only white drapery is around the bust. The hair must of course be powdered, and doubtless a powder puff applied to the face is advantageous to give the portrait its alabaster appearance. A very dark or black background is employed.

If it is worth while recovering the silver from hyposulphite solution employed to fix wet collodion plates—and several firms make it a practice to do so—the saving of the fixing solutions in gelatine work is certainly to be recommended. There is very little doubt that the gelatine plate holds more silver than a film of collodion, and since, with the exception of about 5 per cent., this is all dissolved out by the hyposulphite solution, it stands to reason that a much-used fixing bath must contain an appreciable quantity of the precious metal.

One drawback to the vocation of a photographer is, that he is apt to grow photographic. After a time he finds himself questioning things that are not facts, and otherwise not giving fair play to fancy. A thing to be natural must reflect only what is to be found strictly in nature, otherwise it is rejected altogether. "That is evidently a sketch of Clovelly in Smith's new novel, and a very good sketch too, only he ought not to have put his hero in prison, for there is no gaol at Clovelly, at any rate, at the present day." This is the kind of criticism the photographer gets betrayed into, if he reads a novel; and when he speaks of a painting, he is apt to say: "Ah, yes, a capital bit of coast scenery, evidently in the neighbourhood of the Lizard; but where are the twin light-houses?"

In a word, the photographer is apt to put truth above beauty in a picture, instead of beauty above truth. If he is not on his guard, he will one day find himself quarrelling with a picture of lake and woodland, because the chimney-pots of the owner's residence are not seen above the trees; or will object to a view of the ivy-grown village church, because the new railings put round it are not shown. The same drawback is observed in the painter, who sometimes sacrifices every bit of truth to his sense of romance.

A good etching liquid for steel will be very useful when we come to make photo-etchings upon a steel plate. At present, type metal is usually employed, but this does not always give lines as fine as they should be. The following etching liquid is recommended in the *Engineer* to be used when the preserved portions of the plate have been properly covered with the fatty photographic image. Mix one ounce of sulphate of copper, half an ounce of alum, and half a teaspoonful of common salt powdered, with a gill of vinegar and twenty drops of nitric acid. Steel immersed for a brief period only, becomes frosted, but will be deeply etched if permitted to remain in the liquid for some time.

M. Gustave Hermite calls attention to a pretty experiment that may be worth trying in an idle half-hour. It is simply to take a landscape photograph on luminous paint in the camera instead of upon a dry-plate. Two or three coatings of the luminous paint are applied to a glass plate or metal plate, and this is put into a dark slide and exposed thoroughly on a sunny landscape. The result, M. Hermite says, is very charming, the picture being capable of revival to a certain extent by warmth. By the way, what has become of M. Warnerke's and Captain Darwin's processes of enlarging by means of luminous paint?

The combination of photography with the lantern is rapidly growing into favour with amateurs. A correspondent of a contemporary, in a letter on the magic lantern at home, says: "If I chance to get a day out, and have been lucky enough to secure, say, a dozen quarter-plate views, the first thing I do is to make lantern transparencies from them." Towards this end the tricycle will doubtless be made use of.

A propos of amateur photographers, and the ease with which they can nowadays acquire practical knowledge and obtain practical results, a good many professional photographers are rather alarmed. The rush of amateurs will, they assert, still further encroach upon the narrow field which remains to professional photography. We are inclined to think such fears are groundless. Of course it is possible to take portraits at home, but to do them satisfactorily requires very different apparatus from that which the majority of amateurs employ. The best days of photography were when the amateurs dabbled largely in the art, and the re-wakening of interest in photography, though it may only amount to the taking of photographic "bits," ought to lead ultimately to the benefit of the professional man.

Vanity is the downfall of many a good man, aye, and woman too. A sailor absent from home for some time recently returned to his friends in Brittany, and accounted for his solitary absence by a Robinson Crusoe sort of a story. He had been wrecked in the West Indies, and after living as an hermit for many months, was rescued and brought home. The man became a sort of hero, and all went well with him for some time, until, at an unlucky moment, he consented to sit for his portrait, and the pictures got circulated with the story. One of the portraits happened to come into the hands of an astute police officer, and it then turned out that the sailor was right, so far as he had described his life as one of enforced seclusion, but this had been passed in no more romantic locality than a Brest prison.

Silver stains on linen or other fabric, most photographers know how to get rid of. Make a solution of iodine (by dissolving a few scales of iodine in iodide of potassium solution), and after rubbing the silver stains with it, immerse the fabric in hyposulphite of soda solution. But other stains are not so readily attacked. Iron stains and ink stains, for instance, are sometimes very obstinate, and an efficient means of removal is always welcome. The following advice is from the *Industrial Record.*

For ink stains, dilute hydrochloric acid, which must subsequently be carefully washed out, will generally be found effectual. For the same purpose oxalic acid or salts of sorrel may also be employed most economically by sprinkling it in fine powder over the stains, which are moistened with boiling water. The action of these solvents may be hastened by gentle rubbing, or, still better, by placing the stained portion of the fabric in contact with metallic tin. If there is much iron rust to be removed, dyer's tin salt (stannous chloride) will perform the work at less expense than the oxalic acid compound. Another solvent for such stains consists of a mixture of two parts argol with one part of powdered alum.

The *American Druggist* tells us that a useful substitute for celluloid may be made as follows, and, moreover, the new preparation is not combustible. Dissolve 200 parts of caseine in 50 parts ammonia and 400 parts of water; then add 240 parts of quicklime, 150 of acetate of alumina, 50 of alum, 1,200 of plaster of Paris, and 100 of linseed oil. The ingredients are mixed by a rolling machine, and articles moulded of the paste are hardened by immersion in a bath composed of water 100 parts, gelatine 6 parts, and phosphoric acid 10 parts. Celluloid is an excellent material for making photographic dishes.

The *Daily Telegraph*, in referring to portraiture at the Academy, says:—"The modern portrait painter is on his mettle, and labours sedulously to do his best, as though he were aware that the Sun was among his sitters, taking notes, and that 'faith' he would 'prent them.' Photography, so far from being the rival and the foe of the really good portraitist—it is true that it utterly slays the mediocre and the bad—is his counsellor and his friend. It shows him quite as many excellences to be imitated as defects to be avoided."

Hydrogen is slowly liberated by the action of zinc on water, and it is consequently unsafe to store oxygen in gas-holders made of zinc. Löwe, however, states that if lime water is used in the gas-holder instead of ordinary water, no hydrogen is liberated.

We witnessed an amusing instance of photography being used to prove a self-evident proposition, as Sam Weller has it. At Carthagena, there happened to be a quack doctor, a glib-tongued young fellow with long flowing hair and pointed moustache, who harangued the people on the market place with considerable fluency. He was no new upstart, he said, but the veritable Dr. Francesco, of whom they had all heard, and of whom the pamphlets he held in his hand spoke so eloquently. But to remove all doubt as to his identity, he would hand round photographs to prove what he said. Whereupon, in the coolest manner possible, he held up to view some photographs of himself with name and title printed underneath. Could anything more conclusively demonstrate that he was somebody?

There is, however, one application of photography to prove identity, which would be very useful to banks and the travelling public, if made use of. We mean in connection with the payment of letters of credit. An Englishman goes abroad, and, instead of taking money with him, secures letters of credit from his bankers on various towns he may visit. The banker at home supplies these correspondents of his with his customer's signature, and mentions the maximum sum to be drawn. But, occasionally, the local agents are unused to the business, or are unduly impressed with its importance, and the consequence is, that at times a good many tedious formalities have to be gone through. If, however, a photograph of the customer were sent with the letter of advice, a simple and effective means of identification would be at hand.

"Have you any spoilt photographs to give away for my collection?" writes a painter to a photographer of our acquaintance. Neither the request nor the way it is worded will be unfamiliar to many of our readers, and they will do well to reply, "Have you any spoilt sketches that will go in *my* collection?" The painter will then probably realise the fact that it is impolitic to give away "spoilt" things, and that as he does not like to risk his reputation by parting with defective work, so possibly the photographer with a name might be equally reticent. There is the same similarity, he will find out, between a sketch and a photograph, as there is between a moat and a beam.

Some years ago we pointed out in these columns, as did Mr. Tunny shortly afterwards, that the transfer paper on which carbon photographs are laid, not unfrequently became yellow, and thus suspicion of fading was cast upon the carbon prints themselves. Some samples of unsensitized albumen paper exposed to light in a show-case for the same time as finished prints contained therein have lately come under our attention, and here, while the pictur became yellow, the untouched albumen paper had become equally so. In this case, therefore, what discolouration existed was clearly due to the paper itself, and not to any imperfect washing of the print on the part of the photographer. We suspect there are many albumenized papers, especially among the cheaper qualities, open to this suspicion.

How pleasant it would be if all sitters were as sensible and as philosophical as the lady who some time ago sat to a well-known photographer. In criticising the proofs, she remarked of one, that according to some of her friends she looked like "a simpering idiot,'' naively adding, "but I suppose it is like me." Subsequently, she wrote: "Yes, the 'simpering idiot' is the best"; and gave a good order from this particular negative. "Save, oh! save me from the candid friend,'' is a prayer which ought to be offered up by all who have their portraits taken. In this instance, common sense rose superior to captious criticism.

In Cologne, the police and a certain section of the professional photographers have been continually engaging in contests on the Sunday question. Not always as to whether portraits may be taken during service times on the first day of the week, but whether they may be exhibited. Herr Overheydt, being recently charged with carrying on his business contrary to the law, was acquitted after three appeals, because it was proved that the actual pictures on exhibition were not for sale.

Darwin was one of the first to appreciate the value of photography in recording expression. Two years ago, our readers may remember, we gave some examples in these pages of human expressions—of pain and suffering, of joy and grief, horror and disdain—the late Mr. Rejlander posing as the model in some of these studies. Although the pictures we allude to were wood-cuts, being, indeed, extracted from Mr. Darwin's book, they were faithful copies of photographs, and represented the intention of the author with considerable force.

Few photographers care to treat an unpromising sitter as Rejlander treated a lady of title who visited his studio. "I will not take her; oh! she is ugly,'' exclaimed the artist, as he left the studio, trusting to others to explain matters.

When Rejlander was down with his last illness, a messenger arrived from a photographic stock house, with a note to say that unless payment of an account was made by a certain time, legal proceedings would be taken.

"Bring the camera!" said Rejlander; and a wonderful picture was taken of him as he sat up in bed with bared breast, disordered hair, and the mark of the hand of death upon him. Shortly before his last hour the picture was sent with the message, "Take your pound of flesh from that!"

Not many have seen that picture, but those who have seen it are not likely to forget it. Indeed, we only know of one copy in existence, and time has told upon that.

The Prefect of the St. Petersburg Police has come to the conclusion that to do a thing too much may be worse than not doing it at all. And this is his reason: some time since, a certain Nihilist being "wanted," the Prefect sent round to every police bureau in the Empire, not one photograph merely of the desiderated man, but six cartes, each showing him in a different position, and eagerly awaited the result. He was not long kept in suspense. In the course of a week or two he received a communication from the superintendent of a distant station far away in the wilds of Trans-Caucasia :—"Your Excellency," it ran, "I have the honour to report that I have already caused to be arrested four of the atrocious criminals whose portraits you recently sent, and from information received, confidently hope to capture the other two very shortly. —I have the honour to subscribe myself," &c., &c.

In this country there is a well-known proverb that deprecates the placing of a cart before a horse. The St. Petersburg Prefect of Police, though, has reason to wish he had not placed his cartes—at least six of them—before a donkey.

It is still considered quite *de rigueur* in convict prison circles that all prisoners should leave their cartes-de-visite with the Governor at the expiration of their stay. There is an exchange of "pasteboard," in fact, the convict leaving his carte, and the Governor presenting him with a "ticket of leave" in exchange. That this custom may be duly kept up, the House of Commons voted during the past session the sum of £850, which it is estimated will defray the cost of photographing the inmates in the prisons of England, Ireland, and Scotland.

Photography has long been a stumbling-block to the criminal, and Dr. Belfield, of Chicago, tells us how a murderer was convicted mainly upon photomicrographs of blood stains ; while in another case, the chain of evidence was completed by making enlarged photographs of the machine marks on two hair pins.

"The development of plates is a science, but I can teach anyone to make them," remarked Colonel Stuart Wortley at a meeting of the Photographic Society. There is much truth in this idea, and it will doubtless give comfort to those photographers who use commercial plates, and have to bear the sarcastic remarks of others who are fortunate enough to have leisure and convenience for habitually preparing their own.

The Chemical Society now possesses a nearly complete set of portraits of the past presidents—these pictures having been printed in carbon—and they are hung in the council room. Dr. Russell, who has done most of the work of making the collection, wisely insisted on admitting no silver prints.

Although silver prints often last as long as need be in a family album, a society or club collection of portraits in silver may be regarded as well-nigh valueless.

Mr. Dumaurier's drawings should have some interest for photographers, since without photography they would never have been seen in the pages of *Punch*, and possibly never attempted. Some years ago Mr. Dumaurier found his sight failing him, and he was warned that if he continued drawing in the minute style peculiar to him he would probably become blind. While in this difficulty a friend suggested that he should make his drawings about ten times larger than he wanted them for illustration, and have them reduced by photography. This plan the artist adopted, and so obtains a delicacy equal if not superior to that of his earlier days. He obtains also another advantage. The originals, being of a considerable size for pen and ink work, fetch a much higher price than if they were the same size as the cuts in *Punch*.

There is little doubt the hygiene of the dark-room is too much neglected. A photographer the other day was complaining of continual head-ache and nausea. It was suggested he should look to his dark-room, but he ridiculed the idea that his dark-room could be the cause of it, as it was cool, large, well-illuminated, and ventilated by a patent method of his own. However, after some persuasion, he consented to make an examination, and discovered that the waste pipe of the sink led directly into a drain without the interposition of a trap. As his practice was to place the developing tray or stand in the sink, he got the full benefit of the poisonous emanations whenever he bent his head down to watch the development. Hence the head–ache and nausea. It is a good plan to stop up the waste pipe with a cork, which can be easily removed when it is necessary to empty the sink.

The sun acts as a clock-winder in Brussels. A shaft exposed to the solar rays causes an up-draught, and this draught sets a fan in motion; the fan of course winds up the weight of the clock, but when the weight is near the top, it puts a brake on the fan. The clock has now run for nearly twelve months.

According to an American paper, one phase of the business in the States is the photographing of cats. Babies have to a great extent gone out, and kittens are "in." The tariff for "Pussy's" portraits is just double that charged for "human's," the reason being probably because a "cat-astrophe" of some kind is twice as likely when felines are focussed.

Since the famous farewell banquet to Henry Irving in 1883, when the table napkins used were each adorned with a copy of his photograph, the fashion thus set has largely developed. Instead of the ordinary marking, by the use of worked or written initials or monograms, many people now have their photographs in miniature reproduced on their handkerchiefs, tablecloths, counterpanes, &c.; and the fact that the said photographic impressions come unscathed through the ordeal of washing is likely to place marking-ink at a discount ere long.

A contemporary, in advocating this new mode of marking, suggests that one of its chief merits will be that the most hardened laundress will scarcely dare to retain articles which would actually haunt her with visions of wronged customers if not promptly returned. The plan might be extended to the linings of hats, too, and surely some genius will be able to show us how to adapt it to our umbrellas as well. The most confirmed "gamp-lifter" would surely be moved to restitution should he, on opening his most recently-annexed umbrella, find the face of its injured owner gazing reproachfully down at him from some point in its concavity.

An ingenious artist, dating from the Isle of Thanet, amuses himself every day after dinner by photographing the state of the joint as it leaves the table. By thus taking it, he says, he makes it inexpedient for the landlady to take it.

It would be interesting to know the exact terms which the much-photographed Mrs. Langtry now makes with photographers. Before proceeding to San Francisco, she sat to an Eastern photographer, binding herself under a heavy penalty not to be taken in San Francisco; and the natural inference is that she was paid by the Eastern photographer, for without some valuable consideration no one would enter into so one-sided a bargain. Mrs. Langtry, while in San Francisco, kept strictly to her agreement, but her portrait nevertheless was taken; for an enterprising photographer sent an assistant to the Yosemite Valley, and secured two instantaneous portraits of the Jersey Lily—one as she was getting into the stage coach, and another as she sat on the hotel verandah.

Simple as the collotype method of printing is, there are practical difficulties, and few in this country manage to make a profit by working it commercially;

while even in Germany, where collotype is very much more practised than here, it is by no means easy to get an order for ten or twelve thousand impressions executed with reasonable promptitude.

What can appear more simple or easier than to first coat a plate of glass with an adhesive substratum of albumen and soluble silicate, next to level it, and dry on a film of gelatine made sensitive by the addition of bichromate of potash? The plate is now ready for exposure under a reversed negative, and after this it is soaked in water so as to moisten those parts which are not rendered impervious to water by the action of light. It is now laid on the bed of the press, and on applying the inking roller the exposed parts take the ink, while the damp parts refuse it; but what is of most importance, all intermediate degrees between these extremes are rendered by the adhesion of a proportionate amount of ink.

Easy as the above appear, we hear of troubles in practice. The sensitiveness of the gelatine film varies much according to the conditions under which it has been dried, and sometimes it becomes generally impervious to water, or insoluble. Again, the film is often figured all over by surface markings, such as those gelatino-bromide workers know so well, and these show on the print; but, worse than all, it is a common thing for the gelatine film to break up or strip as soon as the printing has been fairly commenced.

Excellent collotypes of paintings, about half-plate, and each mounted on a kind of *papier mache* plaque, embossed so as to represent a frame, are sent from Germany, these being sold retail at a penny each in London. Photographs of seaside resorts are also occasionally issued in the same size and style, but we do not think our readers can get prints of this character from their own negatives at a corresponding price, as the German collotypers keep reserve plates of such stock subjects, to print when unforeseen circumstances prevent the execution of more profitable work.

Directions for working the collotype process appear on page 412 of our present volume.

In the effort to get out of the common-place, some very curious things were perpetrated in the early days of photography. A man with a bare neck and chest, and a table-cover thrown over his shoulders, immediately became a "study," though it was difficult to see where the "study" came in. A lady with a lace shawl on her head was considered more picturesque than if she had the same shawl arranged in the ordinary fashion. All kinds of drapery were pressed into service, and gentlemen who had the misfortune to have beards, and ladies who were equally unlucky in having pretty faces, were tortured into every conceivable attitude to satisfy the yearnings of the photographer after "fancy pictures." The photographer is more sensible now-a-days, and is contented if he can represent people truthfully as they are.

Another recommendation for illuminating the dark-room. Herr Schumann writes in the *Wochenblatt* that he has for some time past abandoned the ruby screen for his lamp, using, instead, orange glass ground on one side. Lately, however, he has employed nothing but brown tissue paper, oiled. Three thicknesses of this paper are usually sufficient, supported upon a plate of ordinary window glass.

In all these experiments, the principle of "give and take," we repeat, always plays an important rôle. Some light must be admitted, if the photographer is to see what he is doing, and naturally the problem to be solved is to admit a light that does the least amount of mischief. If it were only a question of keeping out every actinic ray, a deal board or brick wall would answer the purpose best of all. As it is, we would recommend the photographer, whether he employs orange or ruby glass, to use a ground surface as well, since the more the light is diffused, the less dangerous is it to the sensitive film. That even two thicknesses of ruby glass will admit plenty of actinic light may be proved by placing them in front of a quick-acting lens; in these circumstances we have secured a picture of a cluster of tall chimneys on a fine day with a three minutes' exposure.

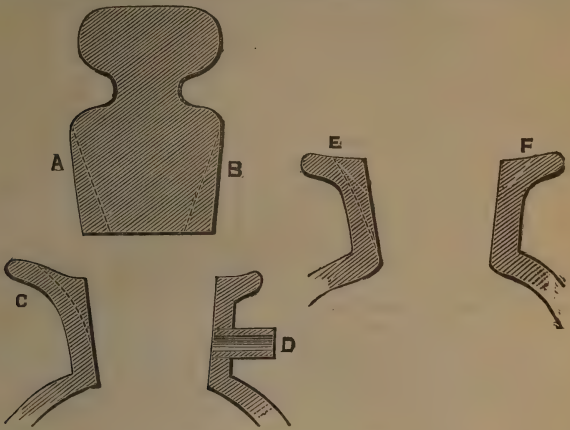
The discolouration of paper is frequently a source of worry to the photographer. Brownness and yellowness that come simply from the natural action of light upon the paper pulp are oft-times attributed in a photographic print to some chemical reaction, and the photographer is held responsible for the sin. In fact, it is not so long ago that an outcry was raised that carbon prints fade, and it was not until very satisfactory proof was forthcoming that the transfer paper, and not the image, was at fault, that sceptics were prevailed upon to give up the idea.

There are several reasons why paper yellows in time, and, as everybody knows, all ancient pages shows the defect more or less acutely. But modern papers discolour yet more quickly than those formerly manufactured, and one reason for this is that many of them contain a good deal of woody fibre. Wood browns in contact with the air comparatively soon, and then then there is the disadvantage that the appearance of the paper is spoilt, and it is less durable. In fine papers, such as the photographer uses, there should be no woody fibre at all, or, at any rate, very little, and this is why it is useful to have the means at hand for detecting the presence of wood. *The Chronique Industrielle* gives a very simple test for the purpose, which is, to moisten the paper with a mixture of one part sulphuric and three parts nitric acid; a yellow colour at once results if the paper contains wood, the depth of colour indicating the proportion that is present.

The unfinished appearance so often noticeable in the case of cartes or other portraits coming from the studio of the amateur is mainly due to the circumstance that the mounts are ordinarily blank ones; such, indeed, as no professional photographer would use. As an exception to this usual order of things, we may mention that an amateur photographer, who is a large chemical manufacturer in the north of England, recently sent us some cartes which were on mounts imprinted in quite the business style, there being a place for the number of the picture, and an announcement that enlargements could be satisfactorily made from the negative. The principal line, however, was "Amateur Photographer," not "Artistic Photographer."

A contributor, wishing to hire a suitable place for gelatino-bromide experiments, advertised in the *Daily Telegraph* for a dry cellar near Charing Cross, no window necessary. A well-dressed man, whose awkward manner and unready answers at once proclaimed him a detective, called on our friend and said he had such a cellar, but in response as to the natural enquiry as to its whereabouts he seemed confused, and ultimately gave a fictitious address. He proved to be one of the new "dynamite staff" of Scotland Yard. If this officer will only take the trouble to revisit our friend's chambers in the Adelphi, he will not only find there abundance of all such materials as are used in making dynamite, but also several very strangely devised pieces of clockwork. At our own laboratory, also, he might find, in addition to these, everything required for making bad coin and forging bank notes ; and, what looks even more questionable, a full-sized reproduction of the bank note watermark, made by the photo-filigrane method of Mr. Woodbury.

From Germany we receive an ingenious dropping bottle. In the stopper are filed two grooves, A and B, these grooves extending more than half-way up. When the stopper is so placed in the neck that one groove corresponds to the lip C, and the other groove to the vent-pipe D, it is easy to pour the liquid out in drops ; but when the stopper is turned round a quarter of a circle, the bottle is perfectly closed. We find that an equally efficient apparatus can be made from an ordinary bottle by filing grooves in the stopper as described, and in the neck as shown at E and F. An ordinary rats-tail file, moistened with oil of turpentine, answers well.



It is pleasant to find that the courtesy which has existed in many quarters among professional photographers, in permitting a visitor the use of their dark-rooms for changing plates, is not fading away. A correspondent, a gentleman whose name is familiar at the Pall Mall Exhibitions, writes us that he has recently made tours in Ireland and also in Italy, and he always found that a few words of introduction on his part sufficed to secure him the hospitality he desired. In Italy he was particularly pleased with the desire to serve him by several brethren of the craft—a disposition, he says, all the more praiseworthy, since our friend was taking photographs similar to those his hosts had on sale. In this way the *mauvais quart d'heure* of changing plates at night in an hotel bedroom was converted into half an hour's pleasant chat.

Some studios put up their notices about payment in advance in the reception-room ; others place it upon their cards of terms ; while others again either convey the announcement verbally, or hang it up in the studio. Of all these plans, we think the most effective is that of putting it up in the studio. There is always a class who object to pay in advance, and the scruples of these are often overcome when they see something has been done on the part of the photographer; while the latter, on his part, may work more conscientiously and with more spirit, if what he does in the studio will influence the payment of fees.

Moreover, the plan of notifying payment by a notice in the studio has the advantage of plainly putting the matter before your patron. There is always plenty of time for the visitor to look about him between the taking of this pose and that, and he, seeing the pains you are at to please him, must be very hard indeed to move, if he is not willing at the end of the sitting to pay your fee. Many photographers request simply a deposit—sufficient to cover the cost of the negative—and leave the rest of the payment till the prints are supplied. In Berlin, some make it the custom to require half the fee to be paid on the first visit; but, as we say, there are many things to recommend the putting up a notice in the studio itself, and taking the money after posing.

Many photographers, in travelling, pack their films between sheets of paper, and if the packages are small there is not much to fear from such an arrangement. But it behoves one to be very careful as to the nature of the paper to be employed for interleaving the plates. No one is likely to employ ordinary printed paper, which almost inevitably leaves impressions behind on the sensitive film, so we need not say a word on that score. Almost as bad are harsh-fibred papers, in which the woody fibre—there is wood in nearly every paper manufactured now-a-days—is completely pulped, and liable, therefore, to abrade the film. Some papers there are, again, which are very acid, and although the photographer is not likely to employ any other but very dry sheets, still this is a feature to be borne in mind. A good bibulous paper is suitable, though best of all is Swedish filtering, which is the purest paper in the market.

There appears to be no other way of steadily producing gelatino-bromide plates throughout the summer than by working by night instead of by day. During the past season, several establishments commenced work at 9 p.m. instead of early in the morning, and these were enabled to continue their labours without a break.

That silver prints made now-a-days are less permanent than those made fifteen or twenty years ago seems to be generally admitted, and it is instructive to note the views of Mr. Foxlee on the subject.

In the old time it was the custom to salt the paper more highly than is usual at present, to sensitize on a stronger bath, and to make use of denser negatives; all these circumstances tending towards the production of an image rich in silver, and exhibiting much body when viewed by transmitted light. The thin surface pictures of the present time are not only poorer in silver, and consequently more liable to destruction, but it is usual to make the albumen film itself thicker than formerly; and the albumen—perhaps by virtue of the sulphur which it contains—is undoubtedly a main factor in determining the fading of a print.

Mr. Foxlee exhibited an old stereoscopic picture which had evidently been printed from a negative of which one half was denser than the other, and the printer had shaded the weak side in order to obtain an approximate equality in the appearance of the two pictures. The image from the dense negative naturally consisted of a heavy deposit of silver, while that from the thin negative was much less rich in silver. This latter had suffered much more by time than the dense print.

In a paper on dark-room illumination, Captain Abney contributed an interesting little fact to the history of photography. It was to the effect that Claudet was the first to suggest, in 1844, developing the latent image under the eye of the photographer. Till then, the Daguerreotypes had been evoked in the dark, and the operation of development was a purely mechanical one. M. Claudet took out a patent in the year named, for employing a red light which should be without effect upon the solarized image, while it enabled the photographer to see what he was doing during development.

Mr. Spiller's remark on the use of aurine for dark-room windows is also well worth writing down. Aurine dissolved in spirit he had employed with considerable success, Mr. Spiller said, for dark-room illumination; while its non-actinic colour constituted it a very suitable medium, it was not a pigment, like chromate of lead, but a true stain, and hence its colouring matter did not consist of separate minute particles.

In respect to this subject of dark-room illumination, no matter how widely divergent the opinions expressed of late, there seem at any rate one or two points very clear—viz., that a yellow or orange light affords sufficient protection to the photographer under ordinary circumstances, and that the advocates of ruby light grow fewer every day. We have repeatedly said that in the matter of light in the dark-room, it is for the most part a matter of "give and take." If you want to exclude all actinic rays, have recourse to a deal board or a brick wall at once; but if you want to see when you are at work, light of some description must be admitted. And we repeat here that diffused orange light—as little of it, or as much of it, as you please—is in our opinion the least injurious to the film compatible with permitting you to see what you are doing.

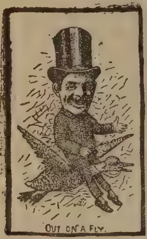
The "stained red" glass, we may mention, of which Captain Abney speaks so highly, is not, it must be remembered, red at all, but actually orange; this, with a sheet of paper to diffuse the light, was, in his opinion, one of the best mediums for the dark-room.

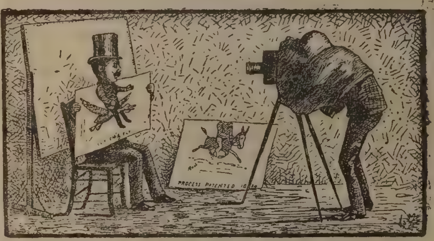
The portrait club system has been introduced into America. The *Danbury News Letter* announces that a Mr. Hendricks, of Stamford, Connecticut, "is building a photographic studio which will be very convenient, as the skylight is on a level with the street, and especially adapted for the instantaneous cabinet photographs which he proposes making at club rates." These rates are two dollars and a-half for a club of twelve, and paying thirty dollars for twelve tickets, the thirteenth ticket being free.

Why on earth do apparatus-makers manufacture instantaneous cameras in the form of gun or pistol? Of all things in the world that renders their owners the objects of suspicion, surely fire-arms are the worst. M. Enjalbert has now an improved photo-revolver, which is said to be of the most ingenious construction, as we are quite willing to believe; but who is going to carry such an instrument? Peaceful citizens have a wholesome dread of anything in the shape of a revolver, and although the little camera will do them no harm, it may bring down mischief on the head of the unfortunate photographer. It is all very well to go skylarking about with a mock sort of pistol of this kind, but one fine day a fellow-creature may misinterpret your motive, and it is always difficult to explain matters after you have been knocked down.]

The detective camera, it will be remembered, has been made in the form of a boot-black's block, and few objects answer so well to disguise the camera. The notion of employing the opera-glass form is not a bad one, but you naturally look like prying when you hold it up, and thus, if your object is to get a photograph unawares, this is at once detected. A black bag, a brown paper parcel, or some ordinary portable object, is the form a detective camera should assume, and there is little doubt that the first manufacturer who fulfils the conditions satisfactorily will find a ready sale for his apparatus; for pictures of every-day life can only be properly secured when the presence of the photographer is unknown.

Although not altogether novel, this simple plan of Mr. Coolidge for producing photographic caricatures is well worth noting. We see that the idea is announced as patented in the United States, but we are not aware that any steps have been taken to protect it in this country. Mr. Walzl, of Baltimore, announces a selection of humorous backgrounds suitable for these caricature portraits, and no doubt, if any demand arose for them in this country, they would soon be forthcoming. Indeed, with this hint before them, many professional and amateur photographers could make some suitable sketches for themselves.





Most photographers possess a ready means of dulling glass, whether the same is for a focussing screen or for modifying the light in a studio. Still we may mention two or three methods more or less known. A hot solution of Epsom salts mixed with a solution of gum-arabic, and applied warm, is useful for temporarily frosting windows: another scarcely less efficient plan is to wash over a strong solution of sulphate of soda, warm, and subsequently, when cold to apply gum-water. The readiest plan of all is to dab the glass with a lump of putty, which, if done carefully and uniformly, imparts a finely-ground appearance. For permanently frosting, a piece of flat marble dipped in glass-cutters' sand and worked wet is to be recommended, powdered emery being used instead of sand at the finish, if a fine surface is desired.

Neither photographers nor their lady-sitters employ powder very much when posing now-a-days. But since this is sometimes considered a necessary adjunct to the studio—it is casually employed for toning down freckles and red hair—it may be worth noting that brunette face powder is better for photographic lighting than the snowy starch that pink and white complexions usually affect. The brunette powder is simply prepared with the least tinge of some brown pigment, and therefore is better calculated to soften any great contrasts of light and shade upon the face.

The ink ordinarily used with india-rubber stamps is a solution of aniline colour in glycerine, and the impressions are generally so fugitive that a few hours' exposure to bright summer sunshine reduces them nearly to invisibility. We have, however, found that by stamping with a mixture of equal parts of a saturated solution of nitrate of silver and glycerine, excellent impressions are obtained. These are of course invisible at first, but they gradually become jet black. Still, it has surprised us to find that in ordinary cases the maximum intensity is not attained for some months.

Other applications of the method suggest themselves. By making an ink with an iridium solution and glycerine, we have obtained impressions on glass which became very vigorous and distinct when fired. Gold, platinum, cobalt, and other metallic solutions can thus be used for decorating glass and pottery.

Dumas, the eminent French chemist, who died last year, was secretary of the *Academie Française*, and one of the representative men of European science. His "Chemistry Applied to the Arts" was the first work to earn him fame, but since the year 1821 he had been before the Paris public. Dumas took much interest in the invention of Daguerre, and was consulted by Madame Daguerre on the sanity of her husband just prior to the latter making known to the public the marvels of Daguerreotype. Still, in spite of his age, Dumas was not the Nestor of French savans; Chevreul, a brother academician, who is still alive and well, and who but the other day reminded his brethren how he had addressed them in the year 1813, was ten years older than Dumas, who was born with the century.

Photography has pretty well killed one branch of art—the painting of magic lantern slides. This is not a matter for much regret, as the calling does not appear to have been particularly lucrative. An artist who has now risen to celebrity once told us that in his early struggling days he was offered an engagement at the Polytechnic Institution to paint slides for the dissolving views. The salary was not high, but he would have accepted it had it not been coupled with one drawback—the painter was expected to take a part in the then newly-invented "Ghost Entertainment!" Our friend thought it was necessary to draw the artistic line somewhere, and he drew it at the personal representation of hobgoblins.

Few photographers realise how much the electric light is now-a-days utilised in photography. They know that certain studios in various European capitals employ electricity, and that it has from time to time been used to produce enlargements and Woodbury relief plates. But they will be surprised to know that every photo-etching establishment in London, and in the big cities of the United States—and these may now be counted by the score—have the electric light installed. These establishments have little chance of existence unless they can produce a printing block in twenty-four hours—that is, take a negative, print it, and etch a metal impression—and some energetic firms there are, who will do the work from first to last in three or four hours. Obviously, this would be impossible without the electric light.

By the way, why should it be deemed a virtue to take architectural views with a drop shutter? One of these days we shall have held up for our admiration an instantaneous view of a milestone taken with some patent lightening snap-drop, and shall be asked to bear witness as to its absolute sharpness. Can it be that there are enthusiasts who imagine that quick exposures were invented for the pourtrayal of monuments and cathedrals, and that drop-shutters are particularly useful for taking church steeples and ancient ruins?

Who invented Baker Street as a photographic resort? It is an interesting question that is not readily answered, and as time goes on, the reply will be still more difficult. But we suppose Messrs. Southwell Brothers had more to do with the matter than any one else, a firm which, in the "palmy days," it may be remembered, kept three studios going all day long. From seventy to one hundred pounds daily were the average takings of the big Baker Street firm in those days, when cartes-de-visite were new-born, and when three guineas a dozen were sometimes asked for them.

To have one's photograph exposed for sale in shop windows is now-a-days evidently regarded as an important step towards obtaining a position within that charmed circle—society. Mr. Laurence Oliphant, one of the shrewdest and most brilliant writers of the day, in his clever novel "Altiöra Peto," makes a wealthy and vulgar financier describe how he and his wife managed to secure recognition by the "first circles." In the course of his narrative, the financier says: "Then we began to give little dinner parties, and Dashington asked our Duchess here to invite us to her parties; we worked the press and the photographers." And, so he adds afterwards, "What with notices in the papers, and photographs in the shops, and financial plums for the poor aristocrats, and pretty women for the rich ones, we got to where we could give entertainments on a large scale, and ask some social lions." It is but fair to mention that the wife of the financier is very good looking, an important factor where photography is concerned.

It is odd to find photographs produced as evidence of a person's insanity. In a case last week before Mr. Justice Denman, one of the Lord Chancellor's visitors in lunacy, in speaking as to the alleged unsoundness of mind, said the person in question produced some photographs, among them a photograph of Mr. Bradlaugh, and, pointing to it, said:—"Is not that a beautiful face?" If this is to be considered a proof of insanity we shall have to be very careful in showing photographs. It is no uncommon thing, for instance, for mothers to produce some abominably ugly portrait of a child, and go in raptures over it, pointing out beauties which nobody but themselves can see. Besides, beauty is a matter of opinion. There may be people who, without being mad, may consider Mr. Bradlaugh beautiful. Besides, is there not a process of beautifying known as retouching? The witness thought the person who called upon him to admire Mr. Bradlaugh's photograph was a little "touched." But might it not be that Mr. Bradlaugh (we mean his photograph, of course) was "touched?"

Oliver Wendell Holmes, whose name is familiar to the readers of these "Notes," as to every other reader who delights in the "well of English undefiled," dwells with touching emphasis upon the value of a photograph. In one of his Autocratic series—the best books ever written, as we heard an enthusiastic admirer call them the other day—he thus describes an old man's impression of a mother who has died young:—"Mother she remains till manhood, and by-and-bye she grows to be a sister; at last, when wrinkled and bowed and broken, he looks back upon her in her fair youth, he sees in the sweet image he caresses, not his parent, but, as it were, his child."

The gentle American poet here speaks, of course, only of the "image" in the old man's brain in the days before photography. "If they had only taken photographic pictures then, as they do now," is the old man's plaint. "All gone! all gone! nothing but her face as she leaned on the arms of her great chair; I would give a hundred pounds for the poorest little picture of her, such as you can buy of anyone for a shilling of anybody that you don't want to see."

To cement brass or other metal upon glass, M. Puscher employs a resin nixture made up of 1 part caustic soda, 3 parts resin, and 5 parts water rubbed up with half its weight of plaster of Paris. Zinc white or white lead may be used instead of plaster of Paris if a slower-drying cement is wanted. Herr Weiderhold prefers to use a fusible alloy for cementing brasswork to glass, made up of 4 parts lead, 2 parts tin, and 2½ parts bismuth, which melts at the temperature of boiling water; he presses the glass into the molten metal, and allows the same to cool in a warm place.

M. Chapiro, the eminent photographer of St. Petersburg, recently brought to the attention of the Polytechnic Society of that metropolis a novel retouching and preservative varnish, suitable alike for gelatine plates, as also for making outlines on lantern slides, since it permits of pencilling with the greatest facility. It is composed of twenty parts by measure of a saturated solution of rubber in benzine, added to one hundred parts of ordinary chloroform or amber varnish; it is ready for use as soon as filtered, and is applied without heat. It is said to have a tooth like ground glass.

A modification in the production of glazed photographs—*cartes emaillées*—was brought forward at the same time by M. Degoe. Instead of collodionizing a plain glass surface for imparting the glaze, M. Degoe has hit upon the happy idea of using glass plates etched with a border, or frame, or wreath, or other suitable design, which naturally comes out matt in the finished picture. In vignettes, the effect is particularly pleasing, we are told; while, in some cases, the name of the firm had been impressed. Something analagous to this was attempted a few years ago in the printing of carbon pictures, and should any of our readers desire to made experiments in this direction, glass plates with etched designs of this kind could be obtained very cheaply in this country.

It may not be generally known that photographs have been found extremely valuable in the cause of charity. Miss Rye, whose hobby is the exportation of homeless and friendless girls to Canada, has a large album filled with some hundreds of photographs, showing the portraits of *protégées* who have, under her auspices, gone out and prospered. Dr. Bernardo goes a little further. He photographs the street Arab immediately after his capture, and photographs him again after six months' experience or so in the Home. Charitable people, to use a slang expression, are at once "knocked" when they are told to "look on this picture and on that."

Herr L. Giese writes in the *Archiv* on the subject of taking portraits in dining-room and drawing-room. The difficulty, as most of our readers know, is to get sufficient reflection on the shadow side of the model, and for this purpose, it is usual to approach a white screen as nearly as possible to the figure. Herr Giese says that a far more effective reflector is the ordinary dining-room mirror, and he has no difficulty in producing harmonious pictures by means of a five-foot looking-glass. The distance at which the mirror is placed, as also its angle, permits the operator a wide range of lighting, and altogether the dull lustreless effect seen in most "at home" portraits falls away altogether in these circumstances.

Turpentine, saturated with camphor, is a wonderful aid in filing glass. The file should be well tempered, and then, if it is kept wet with this liquid, and moved slowly with some pressure, the glass may be filed almost as easily as brass; The glass may even, under these circumstances, be fitted into a lathe and worked by a hand steel tool.

Our correspondents are sometimes given to sending us negatives through the post, and the late Right Hon. H. Fawcett, M.P., intimated that if we did not send to his official residence in St. Martin's-le-Grand for a packet of broken glass, bearing our address, it would be forfeited. The despatch of glass through the post is at all times to be deprecated, but when a package is liable to damage from stamping, the sender would do well to wrap it in black paper, and attach thereto a label with address. This plan, no doubt already known to many of our readers, secures the package immunity from rough usage, for black paper offers no inducement to the energetic stamper.

Is it worth while to retain the word "instantaneous" in classifying photographs for exhibitions or awards? Apart from the meaninglessness of the word—for any exposure from one second to the thousandth part and less passes for "instantaneous"—there are other good reasons for abolishing the term. Half the medals given fall to pictures rapidly taken, but it is not the rapidity so much as the result that is praiseworthy. But if there are "instantaneous" medals allowed, we shall have hangers or jurors one of these days disqualifying pictures taken with a rapid shutter for other classes, let the photographs be views, studies, genre, or what not. The photographer makes his picture in the best way he can, and if a rapid exposure is necessary to his purpose, he must perforce take this factor into consideration.

A dark-tent for changing plates does not seem to be the indispensable apparatus to the travelling photographer some people imagine. With a thick travelling shawl or rug, it is not difficult to improvise a safe changing shelter either in an outhouse or in one of those gloomy recesses in which ruins and other romantic spots abound. Mr. J. Grove, of Castle Grove, Letterkenney, who writes on this subject, assures us that so effective has he found this simple arrangement, that he recently took a series of views of Conway Castle with but a simple wet plate slide in his possession, which naturally compelled him to change his plates with every exposure.

It is more than a dozen years since Mr. Spiller called the attention of the Photographic Society to a white ivory-like material called Xylonite, manufactured from gun-cotton, camphor, castor oil, and a suitable pigment. We ourselves, at the time, made experiment with the material in the form of thin plates, for developing carbon prints, its white and pliable nature giving hopes of successful employment for this purpose. But we found the surface was not sufficiently like enamel, being waxy and liable to scratch. For knife-handles, pianoforte keys, and billiard balls, the material has, however, found a wide application.

A correspondent announces in the *Times* the discovery of two inscriptions of

King Nebuchadnezzar on Lebanon. The inscriptions are engraved on rock, right and left of a pathway, and although their translation has already been made by M. Pognon, a clever Assyriologist, the *Times* correspondent says: "It is very desirable that at least photographs of them should be executed, and mouldings taken before the originals, already so seriously injured and exposed to the vandalism of the natives, have suffered new and irretrievable harm." Pleasure-seekers are, it appears, one of the scourges of Syria, and as these Arabs will do anything to get money, such a discovery as this is never safe. To photograph it is a kind of assurance against loss, and, therefore, its reproduction in this wise should be undertaken without delay. The inscriptions, it seems, which are headed by the titles of Nebuchadnezzar, relate to the felling of cedar trees in the neighbourhood of Lebanon.

Truth employs a new phrase in criticism; instead of repeating Hamlet's oft-quoted dictum about out-heroding Herod, our contemporary speaks of a bigger and intenser nature, as a photographic enlargement of the character.

Mr. Francis Galton, F.R.S., whose name, at any rate in connection with composite portraits, is known to most photographers, has published two works in connection with family records. The first, namely, "Record of Family Faculties," is little more than a collection of blank forms, in which the owner is to fill in data about his great grandfather and mother, &c., &c., and, in fact, give the most exact records he can about his family, and Mr. Galton will give prizes to the value of £500 for the best writing up of these records. The other book is the "Life History Album," which the owner is also to keep up and illustrate with photographic portraits of himself.

The "Life History Album" will represent a man's or woman's life from birth to death. It is divided into periods of five years, up to 75 years of age. The first periods will be filled up by parents, and only when you have arrived at years of discretion are you to write in details about health, occupation, diet, habits, &c. Every five years you are to be photographed, and a portrait pasted in the book, so that when you have passed the three-score years and ten, there will be before you a little picture gallery showing how you have reached the meridian of life, and gradually but surely declined downwards. The volume will hardly be lively reading to its owner, and we are quite sure the illustrations will not raise his spirits, for ever and again he will be looking at the last page and wondering when it will be filled. A man feels little interest in his decline and fall off, and less still will be felt when he is dead and gone.

Travelling photographers should read Mr. B. H. Buxton's letter in another column. During a journey to America, in re-packing his exposed plates, he "laid the first plate film downwards on the packing paper, and the other plates film downwards upon each other with nothing between them." The plate next the packing paper, it appears, got scratched sometimes, but the others were none the worse. However, Mr. Buxton's travelling experience—and it is not small—seems to show that the best mode of packing plates is film to film with a thin sheet of blotting-paper between.

Some of the Berlin photographers complain that after sensitizing albumenized paper, the silver solution sometimes runs off in rivulets, as if the surface of the paper were greasy, and in this way wave-like streaks are produced. A remedy for the defect, according to Herr Roloff, is to blot off, immediately after sensitizing, with bibulous paper, a plan, as everybody knows, frequently adopted in this country.

Photography is not exempt from the law of political economy. When the retouching of negatives was first introduced, the demand for skilled retouchers was far in excess of the supply, and high rates of payment could be obtained. That happy time is passed, and the supply of retouchers now exceeds the demand. Wages for this class of work are about one-third less than they were three or four years ago.

Those about to build studios may be interested in knowing the experience of a correspondent. He has two studios, an iron-framed one, the other with ordinary wood sashes. The first has been built about seven years, the second about twelve, and both were the best of their kind so far as workmanship is concerned. His experience is that while the iron studio has never leaked since it was first put up, the wood one has been a constant source of trouble, despite paintings and puttyings every other year. It is only just to the wood studio to say that the pitch is not so steep as it might be; but, after making allowance for this, the superiority of iron frames seems evident.

The following is a good plan of enamelling cardboard or pasteboard, according to the *Papierzeitung*. Dissolve ten parts of shellac in a sufficiency of alcohol, and add ten parts of linseed oil; to each quart of the mixture add also a quarter of an ounce of chloride of zinc. The cardboard may be immersed in this solution, or the latter may be applied with a brush; before application, however, the paper surface must be polished with sand or pumice powder.

A very old photographic swindle has been revived in Leicestershire and the adjoining counties. Fellows have been going about the country pretending to photograph the mansions of the principal residents, and in some cases taking the portraits of members of their families. Of course, in pursuance of the good old photographic custom, the money was demanded beforehand, and this having been obtained, the "photographers" immediately decamped. The police have been on the look out for these gentry (who gave a false business address in Nottingham), but without result.

We can recal an instance, however, where a kindred deception was practised without any swindle being intended. A photographer who could not afford to keep an assistant was compelled by family affairs to be absent from his studio a whole day. It was in the height of summer, sitters were certain to call, and the loss of a day's takings was a serious matter. Luckily, a friend, who was somewhat of a "cool hand," volunteered his assistance, and cleverly overcame the difficulty. He knew nothing whatever of photographic manipulation, but had been in the studio several times, and was familiar with the procedure of dealing with the sitter. All that he did, therefore, was to disappear in the dark room, come out with an empty carrier, gravely pose the sitter, solemnly focus, and equally solemnly take off the cap after going through the orthodox formula of requesting the sitter to "look pleasant." In each case he declared the portraits to be a marvellous success, and great was the disappointment when each person who sat that day afterwards received a note from the photographer, to the effect that the negative, unfortunately, was broken, and would he or she kindly sit again.

Thirty-two shillings a week is the average salary paid to the members of the photographic staff in the Imperial Printing Office in Berlin.

Once more postage stamp portraits are popular in the United States. The best way of making a profit by them is to do like Mr. C. H. Tondorff, of St. Louis. When he has taken a larger portrait—let us suppose a cabinet—he suggests making stamp pictures from it. He charges one and a-half dollars for one hundred, or twelve dollars a thousand, and all ready gummed and perforated.

Whether made direct from life, or from an existing portrait, the method of producing the stamp pictures is simple enough. A camera with several small portrait combinations is used—let us suppose four—and with eight shifts this will enable two dozen pictures to be taken on a half-plate. Immediately in front of the sitter is placed a pasteboard frame or border, on which he can inscribe his signature in chalk. If the stamp pictures are made from a carte or cabinet, similar borders can be used.

We have seen the collotype press used for the production of forged stamps on a considerable scale; but we do not care to say whether it was in England, Germany, France, or Belgium. They were printed in sheets of fifty, and so good was the imitation, that we do not think detection at all likely. They were not produced with the intention of defrauding any national revenue, but in order to assist that harmless eccentric, the stamp collector, to complete his album of rare specimens.

Zinc dishes are not suitable for use in developing with ferrous oxalate; at any rate, this was the opinion expressed by Dr. Kayser when presiding over a meeting of the Berlin Association for the Advancement of Photography. Minute particles of zinc are cut off by the sharp edges of the plates, and these, settling on the film, cause spots; a proof of this being afforded by the circumstance that similar spots can be produced by dropping a little zinc dust on the film while in the developer.

The extemporisation of something that will serve as a developing dish is generally an easy matter, for a sheet of stout letter paper with the edges turned up and pinned, answers admirably; only it must be supported on a rigid surface, such as a board, a glass plate, or a slate, and lifting threads should be used. A more permanent dish can be made by turning up the edges of a ferrotype plate or sheet of tin plate; but zinc must be avoided for the reason already stated.

Although photographers and others who have occasion to work with pyroxyline and nitro-derivatives of the same nature know the need of caution, few persons imagine any danger to exist in the free handling of the alkaline nitrates. Recent experiences, however, indicate that it is not safe to store such salts in contact with wood or other combustible materials, as recently an explosion took place of a ton of nitrate of soda, and a waggon in which it was contained. This happened at Horsemonden, in Kent.

By using bichromate of soda instead of bichromate of potash for sensitizing gelatinous mixtures, certain advantages are realized, as the sodium salt is soluble in about its own weight of water, and a rather smaller quantity will produce a definite degree of sensitiveness.

Until recently, carbon printers could not obtain bichromate of sodium as a regular article of commerce; now it is made on a large scale, and costs less than the potassium salt.

The position of the photographer on the staff of an illustrated newspaper becomes increasingly important. Mr. McSpedon, at a recent gathering of photographers in New York, said:—"Last summer I was connected with Frank Leslie's illustrated paper. Everywhere I went I would go directly to the photographer of the town, to get interesting points, and through him I gained a better and readier means for illustrating my articles. I am convinced that very soon the travelling artist and correspondent will have very little to do. It will be the travelling photographer and correspondent.

A correspondent writes:—"Having a large stock of glasses which had become so stained and corroded as to be apparently valueless, I tried Mr. Plener's plan of using hydrofluoric acid. Six ounces of the commercial acid and a quart of water were mixed together in a gutta-percha dish, and each plate was immersed for about ten seconds, when it was rinsed with water. Nothing could have been more satisfactory."

In dealing with hydrofluoric acid some precautions are necessary, as it must not be allowed to come in contact with the skin, and it should not be used in the same apartment where there are lenses or other optical instruments. A trace of the vapour takes the polish off glass very rapidly.

Are the best phototypic blocks which can be made by such processes as those of Ives or Meisenbach equal as works of art to the best wood engravings? This is a question very often asked, and, like many other questions, it cannot be answered by a simple yes or a direct no.

The photographic block picture is undoubtedly the more truthful to nature, provided that all the conditions conducive to technical excellence have been fulfilled, as every gradation of light and shade is represented at its proper value; but still, those who have been accustomed to wood engravings complain of a flatness, and say that the outlines are not well defined, or rather that they lack boldness and decision.

These charges have a certain amount of truth, for the photographic engraving has all these faults in comparison with the wood engraving; unless, indeed, we may say that the wood engraving has the contrary faults when compared with the photographic engraving.

The fact is, that almost all wood engravers put in false and exaggerated outlines in order to lead the eye to the main objects in the picture. Let us suppose the case of a cubical box lighted from all sides, and placed before a background of nearly the same tint; the draughtsman begins by drawing lines to represent the edges of the cube, and when these are done, he tries to introduce such shading as may be suitable; but the camera only reproduces the shading. These artificial outlines, which the wood engraver may regard as the main feature of a reproduction, are often in reality a mere index or pointer to the true picture. As long as the public prefer to have the index and the true picture combined, so long will they prefer the wood engraving to the phototype block.

The history of the first dozen plates tried by an amateur friend new to dry plate work is instructive. No. 1 fogged—light discovered entering dark-slide through an ill-fitting shutter. Dark-slide repaired before trying No. 2. Nos. 2 and 3 fogged—light between flange of lens and camera; remedy applied. Nos. 4 and 5 fogged—minute defect discovered in bellows body. No. 6 fogged—light entering camera through old screw-hole unplugged. Nos. 7 and 8 fogged—light of dark-room not sufficiently non-actinic. No. 9 fogged—door of ditto not light-tight. Nos. 10, 11, and 12 fogged—lid of plate box accidentally left open. He thinks by this time he knows a little about the causes of fog.

"Do you make any charge to the dramatic profession for photographs? I require some for professional use only, and have heard you very highly spoken of, and should be glad if you would drop me a line."

So wrote the manager of a travelling company to a provincial photographer of good standing; but the reply was eminently unsatisfactory, as merely indicating the usual charges, and expressing a desire on the part of the writer to know if the manager kept his house always open to the members of the photographic profession.

Light for the dark-room still offers abundant matter for discussion, and Mr. J. R. Sawyer's suggestion that the source of light itself should be thoroughly screened from the eyes is an excellent one. Two years ago, in recommending the Swan electric lamp for dark-room use, we suggested suspending the lamp over the work, and using a piece of tin-foil so as to shade the eyes.

Certainly yellow light is now finding more favour than red light for use in developing gelatine plates, and as far back as 1880, Captain Abney (Bakerian Lecture) pointed out the conditions under which yellow light might be of especial service.

Martin's yellow, one of the nitro-derivatives of naphtol, appears to be one of the best yellow colours for protecting dark-room windows, and years ago we used it for collodion work. It is said to be the colouring matter used for tinting the so-called "golden fabric" that has recently been introduced into commerce, and of which Mr. Debenham spoke so highly at a meeting of the Photographic Society.

Cloth or fabric possesses especial advantages of its own over paper or glass, as it is not likely to be fractured on one hand, or torn on the other. Moreover, by taking a piece of cloth and a few pins with you on a journey, there is but little difficulty in extemporising a dark-room in almost any situation.

A photographic portrait is said to have enabled the Prussian Police to arrest Degaieff, who, it will be remembered, assassinated Colonel Sudeikin.

A photograph on the season-ticket as a mode of proving identity deserves to be more used than it is; but we can recall to mind cases in which the railway season ticket has done service for us as a passport. An innocent deception of similar character was practised by a contributor, who, after much effort, obtained authority to be present at the opening ceremony of the Turin Exhibition; but on presenting himself he found that only wearers of orders could enter. He calmly pinned the badge of the 'Cyclists' Touring Club to the breast of his coat, and was immediately admitted to the presence of the King of Italy and his Queen.

"When I used collodion in the house the other day, there was quite a commotion, windows being thrown open, and suffocation talked of," says an amateur; but he tells us that in the old time, when he worked with ether nearly every day in the week, no remarks were made. Here is a touch of nature; but the home photographer has now the satisfaction of knowing that he is not quite such a nuisance as he was a few years back.

Sulphite of soda as sold frequently contains carbonate of soda, and many persons spoil their work by using such sulphite in the developer. The salt is often prepared by dissolving a quantity of carbonate of soda in warm water, and after saturating the liquid with sulphurous acid, a quantity of carbonate of soda, equal to that first used, is added. If, however, the amount of sulphurous acid first used was not sufficient to entirely convert the first quantity of carbonate of soda into bisulphite, the resulting sulphite will be contaminated with carbonate, and may cause mischief if used in the developer.

The best method of testing a sample of sulphite is to add nearly sufficient of a strong acid to convert the salt into bisulphite, and to notice if any effervescence occurs. If effervescence takes place, carbonate of soda is present, and the sample of sulphite should be rejected.

Now as to the exact method of testing. First, put four drachms of the sodium sulphite to be tested in a glass flask; add six fluid drachms of water, and heat gently so as to cause the salt to dissolve. Allow the solution to cool down to about 85° Centigrade, and add a mixture of one fluid drachm of strong hydrochloric acid, and two fluid drachms of water. The slightest effervescence, or the formation of minute bubbles of gas on the sides of the flask, will indicate the presence of carbonate in the sulphite.

A suggestion made by Captain Abney will prove valuable to the tourist who takes a camera along dusty Continental roads. The inside of the dark back is to be rubbed over with glycerine—a mere trace of course, as all excess must be wiped off with a dry rag.

The glycerine forms a veritable trap for that dust which will penetrate even the very best cabinet work; and the dust adheres to the sticky surface instead of making pinholes on the plates. Of course, the slides must be carefully wiped before fresh plates are put in.

Strolling on one of the South London Commons much frequented by the itinerant photographer, we spied one of the fraternity with an enormous carriage-umbrella under his arm. Our curiosity was stimulated, and we watched his proceedings. He was not long before he caught a sitter, and while he focussed and exposed the plate, his assistant held the umbrella over the sitter. "I wouldn't be without that umbrella for anything," said he to us afterwards. "Why, I can take 'em in the open sunshine, and get a nice shade over the face, and they come out with the eyes fust-class." This was very likely, but the *tout ensemble* —the simpering sitter, and the anxious assistant shielding her almost lovingly with the umbrella—made an extremely funny picture, quite worthy of the detective camera.

If plates are done up in light-tight packages of four, and each three of these packages is wrapped in a sheet of tinfoil, the tourist need not fear the Custom House Officers, as on all principal routes they are quite used to photographers and their belongings.

Only once has our statement as to the nature of a dry-plate package been questioned, and this was in passing alone and on foot from Switzerland to Italy, at the village of St. Remy.

We took out our candle, lighted it, put the red shade in position, and said the plates must be examined by this light, if at all. Curiosity, rather than a desire to search after contraband articles, was the motive that led the soldier to fit up a dark-room, and to watch us as we emptied our slides and re-charged them. Half-an-hour afterwards three Italian soldiers and an Englishman might have been seen smoking and chatting outside the village inn, *Hotel des Alpes Pennines*, this establishment being conveniently situated nearly opposite the Custom House.

A correspondent suggests that the judge's box on every race-course ought to be supplied with a camera, by which the official who occupies the judge's chair could obtain an instantaneous photograph of the finish of the race as the winning horse rushes by. The object of the suggestion is explained, though it is of course obvious. It is intended that the judge should be able to justify his verdict of a short neck, a short head, or possibly a dead heat, by producing a negative on which the actual position of the first two or three horses was clearly shown.

Our correspondent concludes that as the *Flying Dutchman* can be "taken" as it rushes by at a rate of sixty miles an hour, race horses could assuredly be photographed as they fly past the winning post; whilst the only extra trouble necessarily imposed on the judges would be to press a knob or pull a trigger at the supreme moment.

It is even said that the suggestion has been laid before the Jockey's Club, and that action with regard to it is not unlikely. May we then assume that at the Derby of the future the hoisting of the winning number will be followed by the public exhibition of Judge Clarke's photograph of the finish, that the "c'rect card" will be supplemented by the "c'rect carte" of the race?

Only fancy the public's anxious suspense whilst the said "c'rect carte" was being "developed" in some dark recess under the Grand Stand! Fancy, too, how copies of a close finish would sell on a crowded race-course, and, perhaps, found the fortunes of a photographic Dorling. And lastly, though not leastly, fancy what jokes the comic journals would make about the Derby winner being "drawn in a carte and developed" after the race, and all the rest of it. Certainly we would pray, with John Gilpin, that when Judge Clarke first uses his instantaneous camera, may we be there to see!

From a technical point of view there are difficulties, but not more than might be overcome by energy and application. A white background on one side of the course, and a powerful beam of electric light streaming from underneath the judge's box, would certainly be required in dull weather.

The increase in the manufacture of pyrogallic acid has been something enormous since the advent of dry plates. It can scarcely be said that there has been quite a corresponding decrease in price, a result which generally follows when a chemical compound is much in request.

Young men about to start as itinerant photographers would do well to take advantage of the experience of a writer in a Brighton paper, who has had ample opportunities on the Brighton beach of watching the ways of the fraternity. According to this observer they shun papa and mamma and family, but cautiously broach their business to groups of young men, insinuatingly approach sentimental couples, and bear down boldly on any young gentleman who has two ladies in his charge. The last-named are nearly always safe game.

Few awards are so well deserved as the gold medal which the Royal Astronomical Society has accorded to Mr. Ainslie Common for his astronomical photographs. Perhaps the best of all is the "Nebula of Orion," which was issued with No. 1,319 of the PHOTOGRAPHIC NEWS.

Sometimes—though, fortunately, not very often—photographers are taken to task for setting up their cameras in forbidden places on the Continent. The following letter, therefore, written on the French Embassy in London, is interesting, if only to show that tourist photographers have now-a-days nothing to fear so far as French possessions go. The official note says:—" Il n'existe pas en France ou en Algérie de réglement qui puisse empêcher un voyageur de prendre les vues qui peuvent lui convenir. La seule restriction, que l'on pourrait apporter à cette liberté, concerne les fortifications ou travaux defense, et dans ce cas le Ministre de la Guerre pourrait seul donner les autorisations necessaires."

In respect to her galleries and museums, France is even more liberal than we are. It is possible, by the mere asking, to carry a camera into the majority of the fine art galleries, and copy works of art. That is to say, the authorization is rarely refused to anyone who will sign the official regulations drawn up for the guidance of photographers, the principal rule being that only dry plates be used in the work. In these days of gelatine, this regulation will fetter no one.

In a paper read at the Photographic Society in 1880, the Rev. T. F. Hardwich spoke strongly of the absolute safety of the blow-through form of the oxy-hydrogen apparatus. In the discussion which followed, his views did not meet with acceptance, and Mr. Cadett, Mr. Norton, and several others gave instances of the contrary. The lamentable accident at Oldham—the actor in which, it may be mentioned, was a photographer—is sufficient to prove that extreme caution is needed in the manipulation of the gas bags. Whether or not the accident was due, as asserted, to the displacement of a heavy weight on the oxygen bag, and so causing a "suck back," it is pretty certain that lantern exhibitions are attended with danger.

It is needless to say anything as to the danger attending the use of the mixed gases, as all admit it; but more or less risk seems to accompany the use of oxygen in almost every case. If it is stored in an old rubber bag an explosive mixture is extremely liable to arise through the presence of a combustible dust, formed from the disintegration of the rubber; while a zinc gas-holder is not safe, as hydrogen is gradually liberated by the action of the metal upon water. The iron bottle is perhaps the most suggestive of danger, as if a spark reaches the interior the iron burns, and as the bottle becomes weakened, it bursts with a terrific explosion. In the case of the iron bottle which burst some years ago at the laboratory of the Royal Institution, the iron was kindled by the heat occasioned during the compression of the gas. We are informed that it was an ether oxygen arrangement which occasioned the accident at Oldham, and the principal force of the explosion was exerted downward, the apparatus having been forced through the floor.

The dispute between M. Meissonnier and Mr. Mackay touches a point on which photographers are much interested. Ought a photographer to yield to what he believes is caprice or vanity on the part of the sitter, and give the latter a re-sitting, though he feels the portrait found fault with is both truthful and artistic? Theoretically, most would hold that he ought not, but practically, the majority of photographers find themselves forced continually to make the concession. The main point, after all, is to please one's customers, and unless one happens to be a Meissonnier, and can afford to be independent, it does not pay not to be so. A good test as to the sincerity of the motive for re-sitting is to insist upon the destruction of the first negative and print. This will cause the sitter to think twice, and will prevent the disagreeable announcement by the sitter, after an immensity of trouble has been taken, "Well, I think, after all, I prefer the first portrait."

It is worthy of note that, with very few exceptions, when disputes on this point are settled in the Law Courts, the decision of the judge upholds the opinion of the photographer. There was a case heard in the City of London Court, where the Stereoscopic Company brought an action to recover the price charged for photographing a stall at the Fisheries Exhibition. The defence was that the photograph was not properly taken, the particular fault being that it was too light. Mr. Commissioner Kerr, who has an awkward habit of calling a spade a spade, said this was all "rubbish," and that he had never seen a photograph taken better. It is true that the photograph in this case was not a portrait, but fanciful objections are not confined to portraits.

In Italy they do not quite seem to fathom the value of photographic portraits as a means of identification by the police. A young Englishman disappeared in Rome, and his friends were naturally anxious to find him. What better aid could the police have in their mission of search than a few photographs of the missing one? Accordingly the friend sent post haste to a photographer, requesting an immediate supply of copies from a certain negative. One hundred and fifty copies of the portrait were sent to Rome forthwith, and the friends congratulated themselves on their promptitude. But it appears that the Roman police had no idea that the pictures were to serve any useful purpose. and treated them as a gift from certain eccentric Englishmen.

A French amateur of our acquaintance has a very simple way of measuring his pyrogallic acid. He finds that the little bone spoons shaped like a spade that usually take the place of mustard spoons in France, hold as nearly as possible a gramme of pyrogallol, and therefore he calculates by spoonfuls instead of grammes. A powder like pyrogallic acid heaps itself very uniformly, and therefore the plan may be trusted with some certainty ; if the little measure can be relied upon, there is no necessity to weigh your pyrogallol nine times out of ten.

The use of hyposulphite in the developer as a means of shortening the exposure has been repeatedly suggested, and several photographers have adopted the method with advantage. Audra, however, now proposes to attain the same end by immersing the gelatino-bromide plate in a solution containing one part of sodium hyposulphite in 10,000 parts of water, the film being well rinsed before development. The fact of hyposulphite in the developer tending to cause a partial reversal of the image is an objection to its use, and it will be interesting to ascertain whether the same disadvantage attends the new method.

Mr. F. Galton's system of composite portraiture will be fresh in the memory of our readers ; a number of portraits being combined so as to form a typical picture or general representation of a class of persons.

The idea of composite representation has been applied by Mr. G. M. Whipple, of Kew Observatory, to the production of average meteorological curves, so that generalisations extending over long periods may be made obvious at a glance.

Let us give an example. The wind velocity as determined at any given station during a day is recorded as a curved line, but abnormal conditions may render this curve an untrue representation of the ordinary diurnal variation of the wind. Mr. Whipple, however, employs photography to superimpose the curves obtained during a stated interval, strikes out entirely abnormal or storm curves, and draws an average curve through the remainder. A number of average curves may be again averaged, so that a faithful representation of the general diurnal variation is realised.

In the same kind of way averages may be obtained of barograms, thermograms, electrograms, magnetograms, and rain or sunshine curves. The principle is, indeed, capable of a widespread extension to many branches of physical science.

It is not at all unlikely that the tricycle will revive an interest in photography among amateurs. The writer of an article on "The Development of 'Cycling" in *Longman's Magazine* gives several instances of 'cyclists who are also photographers, and remarks, "This photographic work is a great feature in tricycling ; complete apparatus can be easily carried on a modern machine, and many riders with such an outfit are to be seen gliding along the country lanes with a keen eye for "bits." He adds that a couple of well-known 'cyclists recently gave their club a very pleasant entertainment with the lantern, the slides being from photographs taken during a journey from London to the Land's End and back.

We quite agree in Mr. Alfred Dawson's opinion that the most pleasing aspect of the Shakespeare bust in Stratford Church is a three-quarter face view. It is simply because draughtsmen and photographers have hitherto been in the habit of showing the effigy full-face, that so many find fault with it. Any one looking at such pictures must have been struck by the dull, pork-butcher-like aspect of the bard, whereas, seen from a three-quarter point of view, there is much more character. The new Shakespeare Society are going to have a photogravure prepared, and Mr. Dawson has been selected to do the photography. We are glad to find, therefore, that a mechanical full-face view is not to be selected this time.

Many people there are who hold the opinion that a photograph is never more than a photograph. They say: "Now I don't want any nonsense, but pray set up your camera in front of this object, and let me have a copy of it." Fortunately, this class of people is easily satisfied; they know there is nothing in photography, and if you give them a bad picture, they are none the less contented, since it bears out their pet view of the soulless nature of the art. Yet, as in the instance of Mr. Dawson, so in ninety cases out of every hundred, the qualified photographer, if permitted to exercise his taste and judgment, may do a great deal; for the aspect of an object from a certain point of view, or the lighting of it from a certain quarter, let alone skilled development, often makes all the difference in the world between a good picture and a bad one. Both are photographs and represent good technical work, yet they are as different as carbonate of lime is to caseine.

The Chicago Amateur Photographic Club has a pleasant free-and-easy method of conducting its proceedings. At a recent meeting the Secretary announced that he had not the minutes of the previous meeting with him, but, if desired, would read the report of the proceedings as published in a local newspaper. Imagine the thrill of horror which would run through the Photographic Society if the Secretary gravely proposed to put before it, as the minutes, the report published in the PHOTOGRAPHIC NEWS!

Photographers engaged in the production of studies often put the cart before the horse; that is to say, they usually choose their model first, and then think about the expression or rôle he or she is to assume afterwards. Now, in nine cases out of ten, the painter does not evolve the idea of a picture out of his own brain, but has it suggested to him by his observant eyes. Mr. Robinson told us the other day how his "Merry Tale" was suggested to him by seeing a group of ladies chatting in the drawing-room; and the same holds good with Rejlander's charming studies. The latter would see in the streets or elsewhere a model that suggested a picture to him, and, artist-like, he never rested till that model was secured.

The photographer but too frequently does the reverse. A lady of his acquaintance is elegant and good-looking, and being convenient to his hand, he sits her down before the camera, and tries what he can make out of her. Her auburn hair is let down, she has a sheaf of straw put into one hand, and a sickle in the other, and she is bade look like Ceres. But the result too often is that the hair in the picture looks as if it had been "let down" for the occasion, while the model simply appears as a lady half through her toilet. Had you met a model promiscuously, and been struck with her appearance, how her face was that of a Ceres, or a Diana, or a Madonna, or what not, the chances are, when she was posed and draped in accordance with your idea, she would still further please you. Better, then, let studies be suggested by the eye rather than the brain.

There are fewer actual manufacturers of gelatine plates than is ordinarily supposed, as most of those who profess and call themselves makers are merely dealers. Indeed, we could mention one provincial dry plate works which supplies no less than six professed makers. Or, to put the matter more concisely, the weaker are being ousted by the stronger; and only those who can successfully battle with unforeseen difficulties may hope to survive.

"Take a larger piece of bamboo and roll up the prints inside," says a correspondent; "I have received prints from China which were packed in this way, and they were quite uninjured." Bad as bamboo may be when used as a roller for prints, it evidently makes an admirable protective casing.

There are, apparently, some photographers who pass their time in inspecting studios to let. A friend who has had the letting of a studio some four times in five years has had one applicant call upon him on each occasion. The odd part is that the applicant never can remember he has seen the studio before. Four separate times has he inspected the place, and four times has he said it would not quite suit. Our friend firmly believes that if he were to advertise the same studio to-morrow, the first answer would be from this individual "on the look out," to use his own words, "for a studio."

Few spectroscopists would now think of relying on the eye for recording and mapping out lines, the work being done so much better and more rapidly by the camera.

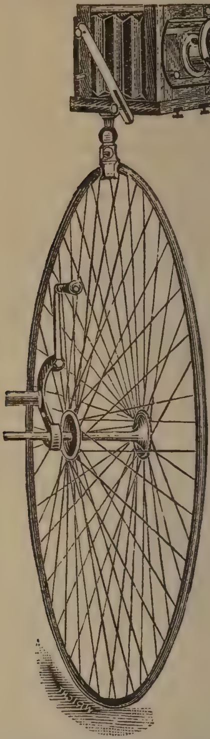
The recent researches of Liveing and Dewar illustrate the value of this application of the camera. When an explosive mixture of oxygen and hydrogen is fired in a close vessel, the flash usually gives a spectrum corresponding to the material o the vessel used, and in the case of an iron vessel with a quartz window, no less than sixty iron lines were recorded on the sensitive plate.

When half-plates are ordered, glasses 6½ by 4¾ are generally meant; but it not unfrequently happens that the old or legitimate half-plate (6½ by 4¼) is required. Much trouble and difficulty might be obviated by calling the smaller size simply "half-plate" rather than "double quarter" or "semi-whole," and the designation "extra half-plate" would clearly indicate the 6½ by 4¾ plate.

Let us give an instance of the desirability of a uniform rule. A. orders a gross of half-plates, and the extra half-plate is sent as being the size more ordinarily asked for; but as A. required the legitimate half-plate, he proceeded to cut down the plates, and in doing so fogged them. He, however, was unaware of this. and made a claim on account of bad plates, but as part of the outline of the cutting-guide was impressed on each, it became evident that A. was at fault. He therefore lost his plates, and had to pay the expense of an arbitration.

Mr. Cobb recently showed us the camera-stand he used for his celebrated pictures of London taken from the top of an omnibus. It consists of a kind of table-top, one edge of which is strapped on to the edge of the omnibus rail, while a single leg, adjustable as to length, servei to steady it. The table-top consists of three thicknesses of wood, so as to allow of a rotary movement on a central pin, and a hinge action of the upper board.

One may look upon the tripod stand as the most unmanageable article with which the photo-tricyclist is encumbered; but no tripod need be taken if a suitable clip is used to attach the camera to one of the large wheels. Messrs. Lancaster and Son, of Birmingham, send us the subjoined sketch, and we can readily believe that such a clamp as is represented may be very useful to others besides photo-cyclists, as the clips may be fixed to a fence, chair, or even the window-frame of a carriage. Indeed, it may be used under many circumstances when a tripod would be out of the question.



Enlargements upon canvas to serve as a basis for portrait-painting are sometimes objected to by the artist, because of the dark outlines printed by photography. A painter is used to black outlines, it is true, but these are made by charcoal, which are easily removed where unnecessary. But the lines printed by photography cannot thus be removed, at any rate without difficulty, and sometimes they are not easy to cover up by pigments. In these circumstances, it is not strange to find that in Paris there are painters who prefer to sketch the photographic outline themselves in charcoal, throwing a lantern enlargement from a small cliché upon their canvas.

The plan has the two-fold advantage that you do not sketch in any photographic trait that the artist thinks is best left out, while, again, the canvas has not undergone any process, and its surface is that which the painter prefers. A good paraffin lantern gives plenty of light for the purpose, and the painter has simply to darken his studio whenever he desires to study his photograph. The plan may be in use by our English portrait painters, but we have not heard of the fact.

There have been few more ingenious modes of setting a fashion than that adopted by the patentees of a new shape in "masher" collars. The plan has been to take all the well-known society "heads"—in a photographic as well as in a social sense—and having "fitted on" the collar pictorially, and added a coat and shirt-front, to photograph the whole. When the "masher" sees photographs in the hosiers' windows of Lord Randolph Churchill, Colonel Burnaby, Lord Charles Beresford, Mr. Henry Irving, and any number of other well-known celebrities wearing this particular collar, the inference is irresistible. He musn't be behind the times, and so he immediately arrays himself in the new shape.

A waxed paper negative may be retouched with water-colours, if the surface be treated with ox-gall, or if the colours are rubbed up with the same material. Waxed-paper negatives are very useful for printing-in borders or clouds, and there is no need to make them by the old wax paper process, as an impression from a transparency taken on ordinary albumenized paper answers well; but before waxing, it is as well to soak the sheet in hot water, so as to remove as much of the sizing as possible.

A filter which consists merely of a strainer so fine as to remove the minutest microbes, appears to be regarded by M. Pasteur as likely to prove of more value for domestic purposes than a charcoal filter; and he has constructed one in which the filtering medium is ordinary porous earthenware, such as that used for battery cells. The extreme slowness with which filtration takes place, and the high pressure required to drive the water through the earthenware, are, however, practical objections to the apparatus.

It is a pity the stereoscope has gone out of fame. With the rapidity of gelatine plates, effects could now be easily secured which would look marvellously well in the stereoscope. It may be questioned, owing to the unaccommodating way in which the earlier stereoscopes were made, whether half the people who looked through them realized the stereoscopic effect. The variation in the length of focus needed to suit all eyesights would surprise anybody who had not studied the subject. In this respect the old stereoscopes were singularly deficient.

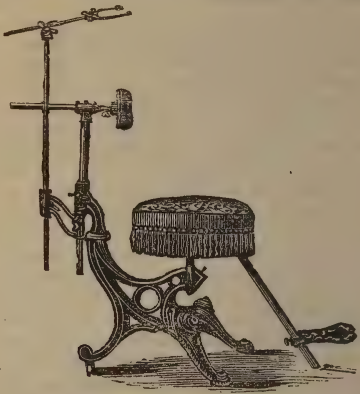
A nearly colourless cement for glass may be with advantage kept ready to hand in the photographic laboratory, and the following has proved to be useful. Seventy parts of finely-cut unvulcanised india-rubber are dissolved in one hundred parts of chloroform, after which fifteen parts of mastic are added. It takes some days for the mastic to thoroughly dissolve, and care should be taken that the cement is made and kept in a well-stoppered bottle.

Photography is made good use of at Scotland Yard, under the directorate of Mr. J. Monro, the Assistant Commissioner of the Metropolitan Police. Attached to a circular, we find a Woodburytype print 6 by 4½, on which are closely grouped together the heads of thirty-six well-known offenders who are now wanted, each portrait having a reference number impressed; while the body of the circular gives a carefully tabulated previous history of the thirty-six, and such clues to their possible whereabouts as may be gathered from past records.

"Don't do that any longer, but purchase one of my posing chairs!" says a New-Jersey advertiser; and the portraitist who cannot make the above

burlesque representation of the too-much-rested sitter furnish him with a hint must be dull indeed.

From the bad to the good is a desirable transition; so let us glance at a well-designed posing chair made on the other side of the Atlantic (De Voe, Springfield, Ohio). The general frame-work is of cast iron, and numerous alterations can be made in a few seconds, as, for example, by changing the



seat, removing the foot-stool, or putting a back and arms in place of the body-rest. The cast-iron framing need cost but very little, and photographers could then purchase the interchangeable extras as required. What British manufacturer will be enterprising enough to put something of this kind on the English market?

Everyday Experiences of Experienced Men.

ENLARGEMENTS UPON CANVAS.

METHOD OF WINTER BROTHERS.

A FINE, compact, and closely-woven artist's canvas—not too dark in tint—must be used, but such a material as is sold already painted or primed is not suitable. This must be thoroughly washed in hot water, then rinsed with cold water, after which it is stretched so as to remove folds, and allowed to dry.

The salting solution is made up as follows:—

Bromo-iodide Salting Solution.

Bromide of potassium	3 parts
Iodide of potassium	1 part
Bromide of cadmium	1 ,,
Water	240 parts

Whichever salting solution is used, the mode of application is the same. A horizontal bath, considerably larger than the sheet of canvas to be dealt with, is tilted, and the salting solution is poured in; but care must be taken to leave so much space uncovered as corresponds to the size of the canvas to be sensitized. The sheet of canvas is now held by two assistants, so as to correspond to the portion of the bath in which there is no liquid, and a stout glass rod is next lowered so as to bring down one end of the canvas, after which the sheet of material is drawn steadily under the rod. The canvas is in this way thoroughly and uniformly saturated with liquid, and the next step is to hang it up in a warm room to dry. It need scarcely be remarked that there is no need to exactly follow the above directions for salting the canvas, it being sufficient to draw the material through the liquid in any way which may be convenient; but it is advisable to draw over a glass rod if practicable, so as to strike off the excess of fluid; the above-described method is, however, convenient when a sufficient number of persons are at hand, four being required when a large sheet—say, three feet by four feet—is being treated.

When dry, the material is sensitized with an acid solution of silver nitrate, prepared as follows:—

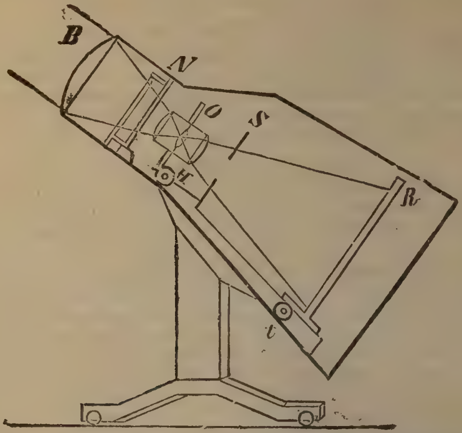
Sensitizing Bath.

Nitrate of silver	4 parts
Citric acid...	1 part
Water	140 parts

The sensitizing is conducted precisely in the same way as the salting. In drying, it is necessary to take care that the canvas is in no way rumpled or creased.

Exposure may be made either in the solar camera, or by artificial illumination; Messrs. Winter preferring the electric light, and employing a six-horse-power engine, and a Siemen s dynamo machine. The optical arrangement is a simple one, a condensing lens being set in front of the arc light, and immediately on the other side of the condenser is a camera with the negative in the position usually occupied by the focussing screen; all that is now required being a screen on which the image can be projected for focussing. The chief point in arranging such an apparatus is to take care that the image of the arc as formed by the condensing lens is formed exactly in the position occupied by the diaphragm of the objective.

A convenient arrangement of the solar camera is exemplified by the following sectional sketch, and it is by no means difficult to fit up such an apparatus in an extemporised form.



B, condenser directed towards sun; N, carrier for negative; O, objective actuated by a rack-work, given by the milled head, H; S, screen to cut off superfluous light; R, adjustable screen to take canvas or paper.

For very large sizes, the solar camera is not very convenient; and if it be not desirable to fit up a room with the electric light, an arrangement like that devised by Solomon for use with the magnesium light may be used, the image being projected magic lantern fashion on the easel-like screen.

As in all photographic operations, the exposure must be learned by experience; but something over ten minutes may be required with the electric light when the scale of enlargement is considerable; still, with good sunlight and a properly arranged solar camera, a much shorter exposure will suffice. In any case, there should be a distinct outline on the canvas before development.

The exposed canvas is immersed into the developing bath, this being made up as follows:—

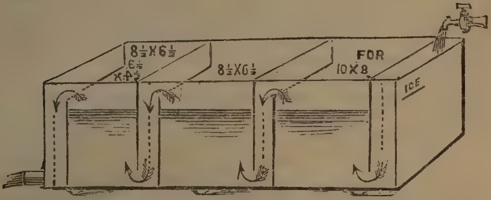
Pyrogallic acid	10 parts
Citric acid	45 ,,
Water	410 ,,

The developer should be used slightly warm, and about ten minutes are required to bring the picture properly out. A thorough washing is required after development. The next step is to tone the image, this being done with such a toning bath as is employed for prints on albumenized paper—as, for example, the ordinary acetate of soda and gold bath.

Fixing, again, requires no special comment, the usual hyposulphite solution, consisting of one part of the salt in five of water, being used, and immersion for ten minutes being ample, as the canvas is very permeable to the liquid. A very thorough washing should be given—let us say a dozen changes of water—extending over a period of twelve or sixteen hours. When dry, the picture is stretched on a frame, and the surface is slightly waxed in order to smooth down the rough fibres which stand up, and to give a brilliancy to the resulting picture. A waxing paste similar to the so-called "encaustic paste" used for silver prints may be used:—White wax in shreds, 1 ounce; oil of turpentine, 5 ounces. Such enlargements as those described are sometimes sold as finished pictures, and at other times are painted upon by an artist.

A WASHING TROUGH FOR NEGATIVES.

Mr. Germanius Shaw says:—



"The above sketch will explain the action of Mr. Stortz's washing apparatus. The hyposulphite, as it is dissolved off the plate, sinks to the bottom of the tank, and as it is the bottom water from each compartment that is forced to flow into the next, and thence to the outside, it will be readily seen that all the plates are thus subjected to a continually changing stream of fresh water. Nor is this all: during the hot weather the troubles of frilling may be effectually avoided by a small supply of ice in the first compartment, without any danger of scratching the films, which it cannot touch.

"Although the tank is not a syphon, it will never overflow (if ordinary care is used to regulate the supply); and should the supply of water suddenly fail, this invention has the advantage over syphon washers, as it does not slowly drain off the water, leaving the films to dry in irregular lines, but the tank still retains sufficient water to quite cover all the plates that are in it. This feature is invaluable where a cistern sometimes empties without any previous warning.

"The comparatively small cost of an apparatus of this kind is more than repaid by the sense of security and satisfaction of feeling that one's negatives are thoroughly freed from the destroying angel—hypo. I strongly advise all who value the permanency of their work to try it."

PHOTOGRAPHING ON THE BLOCK OF THE WOOD ENGRAVER.

When talking over this matter the other day with Mr. Werge—who is an old wood-engraver—some surprise was expressed that among the more or less novel methods of making photographic pictures on the wood block which are being so frequently brought forward, so little attention should be given to one of the earliest modes of procedure, and one which is completely free from the objections that have been mentioned. The method referred to is one which was suggested in our editorial columns in 1858*—over twenty-five years ago—and it consists in rubbing the face of the wood block with a pasty mixture composed of oxalate of silver and water, a trace of gum being added if required. Supposing that the block is four inches square, it is sufficient to take as much of the oxalate as will lie on a threepenny-piece; and after having sprinkled this on the surface of the wood, to rub it well in with the tip of the finger; a trace of pure water or thin gum being applied to the finger from time to time.

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* Photographic News, vol. i., page 193.

The amount of moisture communicated to the block during this process need not be more than is involved in the usual process of facing with white pigment, and is altogether insignificant. As soon as the coating with the oxalate has been finished, the block may be exposed at once under a reversed negative, and the prepared block may be stored away in a dark place for future use. In order to increase the sensitiveness of the oxalate, it is well to slightly fume the block with ammonia, just in the same way that albumenized paper is fumed. If both negative and block are carefully registered into one corner of a deep printing-frame, it becomes practicable to remove the block from time to time, so as to watch the progress of the exposure.

If the engraver is to work by lamp-light, no fixing or further preparation of the block is required, as the oxalate of silver does not darken to any notable extent under these circumstances; and even if the engraver does his work by daylight, it is quite practicable to cover the block with a mask of yellow paper, and just to tear this away piece-meal as the work progresses. At any rate, this is the experience of Mr. Werge, who has worked practically with the process.

Some recent experiences of our own show, however, that it is quite easy to so far de-sensitize the adherent oxalate of silver as to render it unnecessary to take any special precautions for screening the block from the light while the engraving is in progress.

On removal from the printing-frame the block is fumed with hydrochloric acid for a few seconds, the most convenient method of doing this being to pour a little of the strong commercial acid into a flat dish, and to support the block over it—face downwards, of course—by means of a couple of glass rods, or in any way which may be convenient.

Another, and perhaps more complete mode of de-sensitizing the oxalate, is to slightly moisten a sheet of blotting-paper with a saturated solution of common salt, and to lay this paper on the face of the printed block; contact being established by a pad and weight. Ten minutes are generally sufficient, and the block need not be damped nearly so much as it would be if a drawing were made upon it with washes of India-ink.

The negative required is a reversed one—that is to say, one which will give a print having the sides intercharged each other; and a very convenient method of making such a negative is to direct the uncoated side of the plate towards the lens when the exposure is made in the camera. Of course the back of the plate must be clean, and in focussing allowance must be made for the thickness of the glass.

AN EASY METHOD OF COLOURING CARBON TRANSPARENCIES AND PHOTOGRAPHIC CARDS.

BY E. EDWARDS.

THE method which I am about to describe requires very little practice to become proficient in it, and can be used by anybody. The colours which are used in this method are excellent for colouring photographs, and also for canvasine painting, an account of which was given in No. 1358 (Sept. 12,

p. 578) of the Photographic News; it will, therefore, be unnecessary to give the details of canvasine, as the only difference in the working is, that the print must be coloured before the canvas effect is fixed.

The first thing to be done is to prepare the paints. Get from any wholesale chemist a small quantity of different aniline colours or dyes, and dissolve them separately in spirits of wine, gradually adding the spirit until all is dissolved; dilute by about its own bulk of water, and add ox-gall until the colours flow smoothly from a camel-hair brush over glazed paper; when this has been attained, the colours are ready for use, and the painting may be commenced. It is advisable for the beginner to commence with a portion of the transparency which has the smallest surface of the same colour, as it requires a little practice to lay on an even coat on a large surface, such as the sky or sea. If the colour is piled on by degrees with dilute colour, it renders the laying on of a smoother coat much easier. It is as well to give the transparency a coat of varnish when the colouring is completed and quite dry. For colouring cards the colours should be laid on very dilute (especially the flesh colour), and should be laid on in successive washes till the desired colour has been attained. The colours most useful are—lemon-yellow, green, orange red, blue, violet.

For flesh colour—lemon-yellow and red.
For different shades of green—lemon-yellow and blue.
For lilac and purple—violet and red.
For jewellery and fair hair—orange.

The commonest water-colour brushes give as good an effect as the most expensive ones.

SUBSTITUTE FOR A GROUND GLASS.

Mr. F. A. Jackson, writing in the *Photographic Times*, says:—"While out viewing the other morning I was so unfortunate as to break the ground glass of my camera. As a substitute I stretched my white handkerchief across the back of the camera, closing the empty frame over it, and found no difficulty in securing a good focus. The fact may be of use to others."

THE HYDROXYLAMINE DEVELOPER OF EGLI AND SPILLER.

The authors say:—"For the development of gelatino-bromide plates, we recommend the following solutions:—

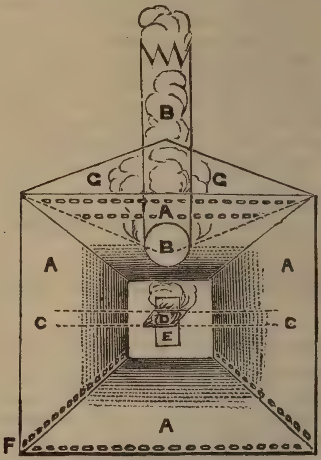
A.—	Hydroxylamine hydrochloride	32 grains
	Citric acid	15 ,,
	Potassium bromide	20 ,,
	Water	1 ounce
B.—	Caustic soda	1 dram
	Water	1 ounce
C.—	Potassium bromide	20 grains
	Water	1 ounce

For a 7½ by 5 plate the film is first soaked for about one minute in three and a-half ounces of water containing one drachm of A; about 20 drops of B are then added, and, if necessary, an extra 10 or so. Should the image show signs of over-exposure, or if the plate is one of the specially sensitive kind, a few drops of C must be used to restrain the action still more. The advantages resulting from the use of this developer are the following:—

1. The image is of a *wet-plate* tone, perfectly free from stain or deposits.
2, A great variation of exposure is permissible.
3. The solution is not acted on by the atmosphere, and therefore does not deteriorate during development from external causes."

MR. FREWING'S PYROTECHNIC LIGHT FOR PHOTOGRAPHERS.

The lamp is made of ½-inch deal; it is about 24 inches long from front to back; the front 18 inches square, the back 10 inches square; a glass in front, and a door in the back, and it is whitewashed inside.



A A A A, Wooden box, whitewashed inside; B, Chimney to carry off fumes; C C, Two wires to carry fire saucer; D, Fire saucer; E, Door in back of box for inserting fire pot; F, Ventilation holes, to make draught up chimney; G, Holes to take off smoke above glass.

To make the fine composition (pyrotechnic) suitable for the lighting of the picture to be copied, take—

Nitre	17 pounds
Sulphur	6 ,,
Orpiment	2½ ,,

Finely sift each separately, and then mix carefully together with the hands until thoroughly mixed together; the better they are mixed the steadier the light.

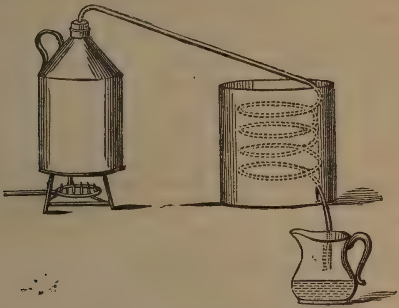
To copy a 15-inch picture (line) down to a 12-inch for the above process, about four to six ounces of the mixture is put into the iron pan and ignited, and the reduced wet-plate negative will be finished, as far as the exposure goes. It may be printed, if frame is held close to the glass of lamp, with about four times the quantity of fire used in four batches.

Care must be taken to avoid inhaling the highly poisonous arsenical fumes resulting from the orpiment.

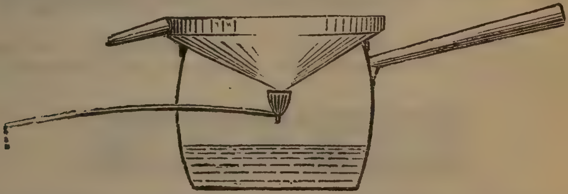
When the apparatus is used for portraiture, a sheet of very thin tissue paper should be placed on the glass to diffuse the light.

DISTILLING WATER.

One of the best forms of still for the photographer to employ consists of a tin can or bottle in which the water is boiled, and to this a tin tube is adapted by means of a cork, one end of this tin tube terminating in a coil passing through a tub or other vessel of cold water. A gas burner, as shown, is a convenient source of heat, and in order to ensure a complete condensation of the vapour the water in the cooling tub must be changed now and again.



Sometimes the vapour is condensed by being allowed to play against the inside of a conical cover which is adapted to a saucepan, and is kept cool by being filled with cold water; and in this case the still takes the form represented by the subjoined diagrams; such compact and portable stills being largely employed in Ireland for the private manufacture of whisky. It is scarcely necessary to say that the condensed water trickles down on the inside of the cone, and flows out by the pipe.



QUICK AND SLOW DEVELOPMENT.

Dr. C. Sturenburg, writing in the *Deutsche Photographen Zeitung*, says:—"Very many persons who have attentively studied the various points relating to photographic operations have recognized the fact that slow development has very decided advantages over rapid development, although the stronger, and therefore more rapidly acting, developer may require a somewhat shorter exposure than is the case when a weaker developer is used; and these remarks may be considered as applicable not only to the dry process, but also to the wet.

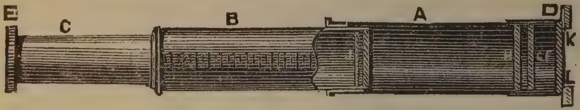
More especially is it to be noted that a weak developer works much more cleanly and uniformly than a strong one; indeed, to use a strong developer successfully requires a very experienced hand when it is essential to obtain good clear skies in large landscapes; but with a weak developer this is quite easy. Moreover, in the case of a slowly-developed picture, there is greater harmony as regards the gradations of the tones, this being especially notable in the case of interiors. This is probably the case, because (assuming the exposure to have been correct) the dark parts have more time to develop, and it is easy to frequently pour on a fresh developer, and one need have no fear that the lights will become too intense and hard.

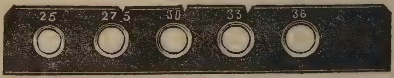
For all this, cases may arise in which a slow development is required in order to obtain hard images, as, for example, in the case of line subjects; but in such instances the developer must possess a special constitution; that is to say, it must be far more acid than when portrait or landscape photography is concerned (wet plate). A weak developer, constituted with excess of acid as above, gives a much finer deposit of silver than a strong developer; this being a consequence of the slownes with which the metal is precipitated. For this reason, transparent positives which are intended for enlargement are much better when developed slowly.

In the modern dry process the same appears to hold good, although the conditions of development are widely different.

THE SIMONOFF PHOTOMETER.

The apparatus is represented by the subjoined figure. At the end, D, will be seen two grooves (K and L) in which slide the strip of metal containing the holes of determinate size serving as diaphragms, one of these strips being represented below.





Immediately behind the diaphragm are situated three discs of opal glass (F, G, and H), these serving to soften and diffuse the light entering the instrument; and it may be advisable, in some cases, to replace one or two of them by discs of ground glass. At one extremity of the sliding tube, B, is fitted a transparent screen, J, on which are inscribed some figures; and the tube, C, should be so adjusted that the observer can see these figures quite distinctly; indeed, if the observer is in the habit of wearing spectacles, he should use a lens at E, corresponding to those of his spectacles.

For the use of photographers the diaphragms are marked so as to make them indicate directly the relative times of exposure, the No. 1 stop corresponding with an exposure 1, and so with 2, 3, 4, &c., up to 36, this arrangement serving to make the apparatus very simple in working. Let us take an example. If, with a light corresponding to No. 4 on the photometer, an exposure of two seconds is required, it will be necessary to give an exposure of—

$$\frac{6}{4+2} \text{ or three seconds}$$

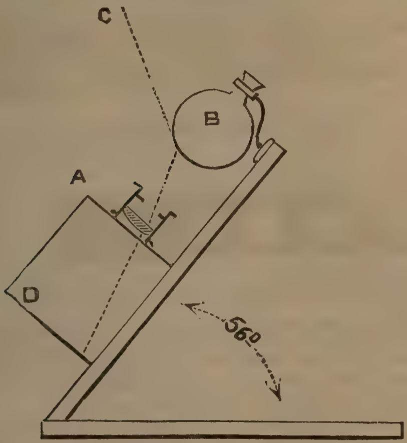
if the photemeter indicates 6. Or if the photometer indicates 8, the exposures will be—

$$\frac{8}{4+2} = 4 \text{ seconds ;}$$

while No. 2 on the photometer will indicate an exposure of one second ; and an exposure of half a second will be given if the indication of the photometer is 1. In fact, all through these numbers the unit of exposure corresponding to each degree of the photometer is half a second ; and to find what is the unit of exposures corresponding to 1 on the photometer is a matter for experiment in each case. Instead of a series of fixed diaphragms, a single adjustable aperture made on the Noton principle, of two square openings sliding diagonally across each other, may be used, and, in this instance, the reading is taken from a graduated scale.

McLEOD'S SUNSHINE RECORDER.

This instrument consists of a camera fixed with its axis parallel to that of the earth, and with the lens northward. Opposite to the lens there is placed a round-bottomed flask, silvered inside. The solar rays reflected from this sphere pass through the lens, and act on the sensitive surface. The construction is illustrated by the subjoined cut, A being a camera supported at an inclination of 56 degrees with the horizon, and B the spherical flask silvered inside, while at D is placed the ferro-prussiate paper destined to receive the solar impression. The dotted line C may represent the direction of the central solar ray at one parti-

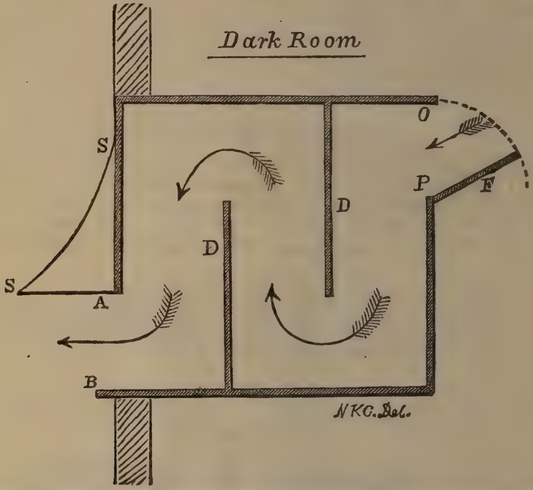


cular time, and it is easy to see how the sunlight reflected from the flask always passes through the lens. As the sun moves (apparently) in a circle round the flask, the image formed by the lens moves round on the sensitive paper, forming an arc of a circle.

The inventor prefers at present to use the ordinary ferro-prussiate paper as employed by engineers for copying tracings, as this paper can be kept for a considerable length of time without change, and the blue image is fixed by mere washing in water.

VENTILATION OF THE DARK-ROOM.

In taking precautions against the entry of light into his dark-room, the photographer frequently stops all circulation of air; still, there is not the least difficulty in providing for thorough ventilation without in any way incurring a risk of light gaining ingress. A kind of ventilator excellently well suited for general use is one constructed on the baffle-plate principle, and a sufficient idea of such a ventilator may be gathered from the above sectional diagram. One or more ventilators of this kind should be placed near the floor, and also near the ceiling.



STRIPPING GELATINE NEGATIVES OR POSITIVES.

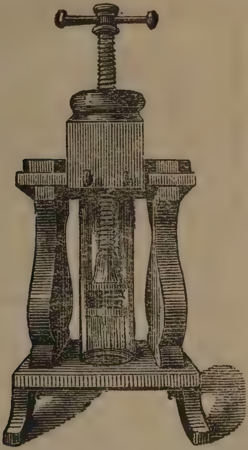
M. Bory has recently published a suggestion to use hydrofluoric acid for this purpose, but he appears not to have worked out the practical details of the method so thoroughly as was the case with Mr. Plener.

Mr. Plener's method of stripping is best carried out by building up a wall of cardboard strips round the negative, and, after levelling, pouring on a warm solution of gelatine. When the film is dry, or nearly so, it is immersed in the dilute acid until it can be easily stripped off, after which it is rinsed thoroughly, and allowed to dry. If the wet film be carefully squeegeed down on a sheet of waxed glass, it can be easily separated as soon as dry, and under these circumstances the film negative is of course obtained with a beautiful even surface. Another method, which may be occasionally useful, is to immerse the stripped and still wet film into a bath of methylated spirit, a proceeding which causes the swelled film to rapidly shrink to near about its original size; after which drying between sheets of blotting-paper serves to remove almost every trace of spirit, so that the negative may be ready for printing from in a very short time.

A DIVIDING PRESS FOR EMULSION WORK.

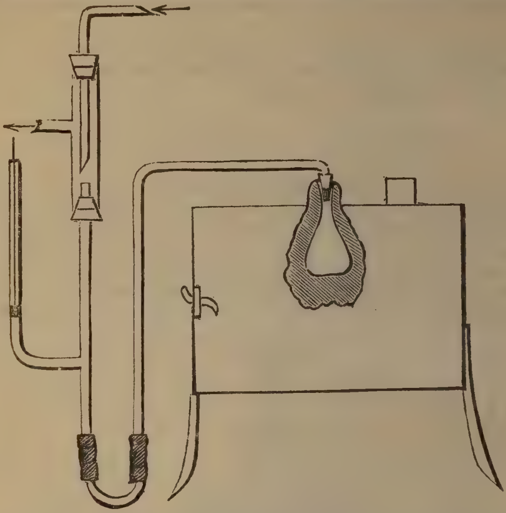
BY L. DAVID.

The apparatus about to be described is especially available for those who may wish to work on a large scale, and the arrangement consists essentially of a cylinder of strong glass, which should be as uniform in the bore as possible. This cylinder is set over a sieve of stout plated brass wire, having a mesh of 2 m.m. (about one-twelfth of an inch). By means of a stout framework of wood the cylinder is held in position, and by undoing two thumb-screws the cross-head of the framing can be removed easily, so as to liberate the cylinder. A wooden piston, provided with an india-rubber packing-ring, is forced down into the glass cylinder by a screw, as shown in the drawing. With the apparatus in question the work of dividing the emulsion is easy, and the cut threads or strips are allowed to drop into a porcelain vessel placed below the base-board of the apparatus.



WILSON'S THERMO-REGULATOR.

The arrangement here illustrated, which, though not new in principle, at least has the merit of requiring only ordinary laboratory fittings. The empty flask, which is placed inside the drying-cupboard or room, must vary in size according as a higher or lower temperature is to be maintained, and it may have a capacity of a few ounces or several gallons. It is connected, air-tight, with a U-tube, the larger portion of which is filled with mercury. Instead of using a continuous glass tube bent at the proper place in the flame, it is sometimes better to use straight tubing for the longer pieces, and to attach a short U-piece with stout rubber joints.



When the air inside of the flask becomes expanded, it depresses the mercury in the inner, and raises it in the outer limb, until it more or less completely cuts off the supply of gas, which passes in the direction of the arrows.

The outer tube bears a lateral branch, into which a piston, made of a knitting-needle and a disc of leather, fits. By pushing this down a certain distance, or by raising it up, so as to draw some of the mercury over into the branch, the temperature at which the mercury would otherwise cut off the gas may be varied any time.

The arrangement shown is very easy to adjust to the required temperature, and is only subject to variation by the fluctuations of barometric pressure; but this may be disregarded in most instances.

MATT PICTURES ON ORDINARY ALBUMENIZED PAPER.

Pictures without gloss may be obtained by sensitizing the back of ordinary albumenized paper instead of the face; but such prints become very much weakened during the operations of toning and fixing, and the raw surface of the paper does not give a satisfactory face to the prints.

Herr F. Wilde sensitizes the albumenized paper upon a special ammonia nitrate of silver bath, which so far disintegrates the albumen as to make it yield prints with a very pleasing matt surface. All other operations are conducted as in the case of ordinary printing.

To prepare the ammonia nitrate sensitizing bath, one part of nitrate of silver is dissolved in eight or ten parts of water, and sufficient liquid ammonia is added to re-dissolve the precipitate which is thrown down at first. A solution of citric acid, containing one part of the acid in ten parts of water, is then added to the ammoniacal solution until a faint turbidity, which does not disappear on agitation, is produced. A volume of ether equal to one-tenth of the bulk of the silver solution is next added, and the sensitizing bath is raady for nse.

MAKING ENAMEL PHOTOGRAPHS.

BY T. INGLIS.

A SHEET of any smooth-surfaced glass (plate is best) is cleaned by any of the usual photographic methods; now rub over the plate a solution of alcohol containing about five drops of nitric acid to the ounce; rub over the glass, and polish with a dry piece of Canton flannel; finally dust a little soapstone or French chalk from a small muslin-covered box containing the chalk; brush it off lightly with a clean piece of Canton flannel; be careful not to rub hard, as in that case the chalk would deaden the polish of the glass plate. This done, the glass is now coated with plain collodion, five grains cotton to the ounce of equal parts alcohol and ether. The plate is now allowed to dry, and can be kept in this state any reasonable length of time. When dry, lay the plate upon some level place, and cover with a solution of plain gelatine about the consistency of cream, at a temperature of 90 or 100 degrees; allow the plate to lie flat until the gelatine sets, which will depend on the temperature of the room.

When dry, stand the plate (or plates) up to dry, and store them away; in this state they will keep indefinitely, and it is well to keep a stock on hand in this condition, as pictures can be mounted in a few moments.

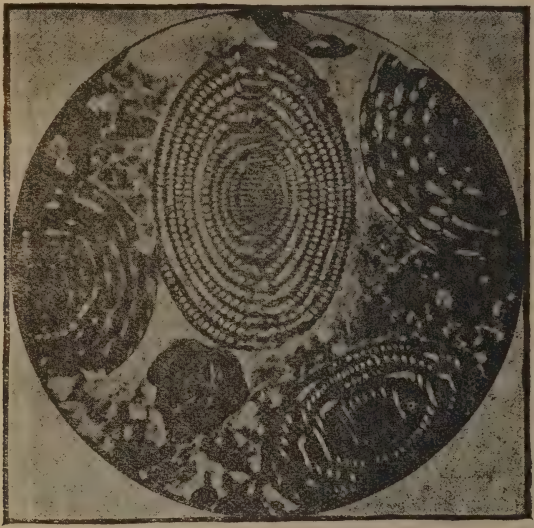
To mount the picture, lay one or more plates upon some level place over the sink, so that the water to be used will have free escape to the waste pipe. Cover the plates fully with water, allowing as much to remain on the surface as possible, lift the pictures from the water they have been washed in, and lay them face down upon the prepared surface of the plate, filling it with as many prints as it will hold, arranging them according to their sizes; pay no attention whatever to the bubbles. Have a piece of thin rubber cloth and a squeegee; lay the rubber cloth over the plates, and with the squeegee press the pictures into contact with the glass, at the same time take out all air-bells by passing it back and forth over the plate. This done, run around the edge of the plate with a knife to cut off the gelatine and collodion, ½ inch; this is to allow the paper that is mounted on the back of the picture to adhere to the glass, which will thus bind the whole thing down until liberated by being cut inside this safety edge, otherwise the pictures would be apt to leave the glass before they are thoroughly dry, and thereby lose the brilliancy they would have if properly dried. After the pictures have got surface dry, give them a coat of thin gelatine, and cover them with a sheet of Manilla paper or any common paper, same size as the plate; now mount them with cardboard, known as printers' card-board, because it is cheap and answers every purpose; finally cover the whole with an enamel sheet of paper of any tint desired, thus having an enamelled mount, when the picture is finished, as well as an enamelled photograph. After they are thoroughly dry, cut inside the safety edge, when the prints will come off with all the beautiful finish possible. The prints may now be stamped out with a round or square cornered die, or cut with a knife any desired shape; the edges may be bevelled and bronzed with a little gum-arabic and bronze applied with a camel-hair brush.

EXPOSURE IN PHOTOGRAPHING MICROSCOPIC OBJECTS.

BY I. H. JENNINGS.

No rule can be laid down as to the duration of the exposure. It depends (1st) on the focal length of the lens used ; (2nd) its aperture, wide-angle lenses being far quicker than those of low angle ; (3rd) the nature of the light used ; (4th) the nature of the object, yellow and brown objects always requiring a prolonged exposure ; (5th) the development. An operator who uses a weak developer will always expose his plates for an unnecessarily long time. The beginner will perhaps think the exposure the most difficult part of photo-micrography, but as he progresses he will alter his mind, and think the proper illumination of the object far more difficult.

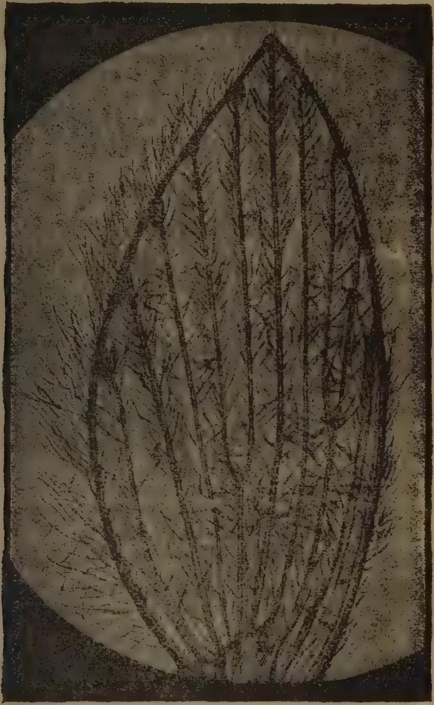
Using a good paraffin lamp, and lenses of from 5 inches to $\frac{1}{16}$-inch, the exposures may vary from a fraction of a second to half an hour. For instance, the larva of a flea, a very transparent object when properly illuminated, will not require more than half a second with the 2-inch objective ; while with the same lens, a section of coal may require twenty minutes. The section of Alveolina limestone figured below, although of a white colour, and apparently very transparent, had an exposure of fifteen minutes. As a rule, all rock sections will require a rather long exposure, as they stop a large amount of light. All sections should be as thin as possible ; yet a good colour is of more importance than thinness. The writer has a section of a tertiary



SECTION OF ALVEOLINA LIMESTONE, HERAULT, BELGIUM.

limestone from Bengal, of a strong yellow colour, which he has often vainly tried to photograph satisfactorily, although the section is most admirably cut, and very thin.

The wing of a midge, here shown, will serve as a good example of a very transparent object, which yet has plenty of detail. This object had an exposure of a second; less would have sufficed with a more powerful lamp.



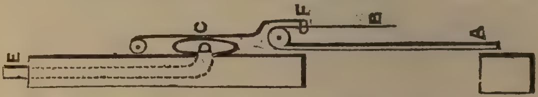
WING OF MIDGE (PSYCHODA).

High powers, being used chiefly with very transparent objects, do not require the tremendous exposures that people generally imagine. A $\frac{1}{16}$-inch, when properly illuminated, will give a good clear image on the focussing screen five feet away from the object. When the writer first began using high powers, he heard such exaggerated statements about the difficulty attending their use, and the long exposures they required, that on first trying *P. angulatum*, he gave an exposure of an hour to his transparent object: On developing, the plate came out almost clear glass; only a faint ghost of the object could be seen on the plate. A subsequent exposure of fifteen minutes, under the same conditions, gave a fair negative. All objects are not fitted for photography, therefore it may be taken as a rule that if any object bears an exposure of half an hour with any lens without being fully exposed, it is simply useless to attempt it. There is a little scarlet mite common in gardens, the scarlet Trombidium, which, owing to its colour, may be exposed for almost any period without getting any better photograph than a blank outline. Such objects should, if possible, be bleached before attempting to photograph them.

When magnesium ribbon is used as the source of light, the exposures become very rapid. The writer has never used this light with low powers, but he has found ten seconds to fifteen seconds ample for diatoms with the $\frac{1}{16}$-inch objective.

JONNIAUX'S SHUTTER.

This apparatus, which can be constructed without difficulty, consists of a flap A, provided with a needle, B, placed as shown in the accompanying sectional diagram. Over the needle B is the ring F, this ring being attached to a hinged piece C. The hinged piece C is lifted by the air-ball D, which expands under the influence of air forced in through the tube E. If the flap is only lifted until it is in a horizontal position, the ring remains on the needle; but if lifted beyond this position the ring passes over the end of the needle, and the flap closes immediately. When a spring is attached to the flap, an exposure as short as one-twentieth of a second may be made.



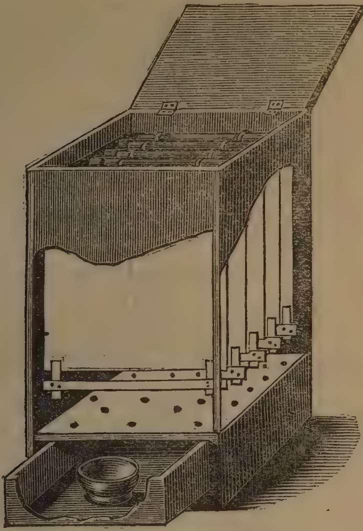
REMOVING HYPOSULPHITE FROM GELATINE FILMS.

A trace of hyposulphite remaining in the gelatino-bromide film has caused the destruction of many a good negative; and the means of removing this deleterious agent, suggested by M. Felisch, is worth consideration. He makes a bath with about equal parts of iodide of potassium and iodine dissolved in water, so as to make a solution having about the tint of port wine, and the washed plate is allowed to remain in this for a few minutes, a final rinse in water being all that is then required.

FUMING THE SILVERED PAPER WITH AMMONIA.

BY DR. PAUL E. LIESEGANG.

When fuming is resorted to, the printing is more rapid and more brilliant, while the pictures tone more readily. He who will profit by these advantages should take a wooden box of the required size, and must provide it with a properly-hinged and well-fitting cover. About six inches from the bottom is to be fitted a perforated board, as shown in the drawing, only it is well to make more holes in it than are indicated by the sketch, excepting in the central portion. Under this false bottom a drawer is placed, a portion of the front of the box being cut away for the purpose, and in this is placed a saucer containing strong ammonia. The paper must be quite dry, but as in this condition it tends to roll up, it is as well to attach a wood slat to the lower edge of each sheet, by means of two American clips. In the upper portion of the box a number of cross-bars, upon which the sheets can be clipped or pinned, are provided. These may be about three inches apart.



The sheets may remain between ten to fifteen minutes in the fuming box; but a longer time is required if it has been sensitized upon an acid bath than upon a neutral one, and in winter a longer time is required than in summer.

BEACH'S POTASH DEVELOPER.

The introduction of sodic sulphite in the pyrogallic developer was a great advance, and did much to oust ferrous oxalate, and restore pyrogallic acid its good name, which it had well-nigh lost through its staining qualities. Still, the use of ammonia, necessary to render the pyrogallic alkaline, was objectionable. The fumes of ammonia are most injurious to delicate lungs, and have perhaps, in many cases, done much to induce an attack of pneumonia. Then, strong solutions or prolonged development frequently will fog the plates, and it is always more or less uncertain how much bromide should be used as a restrainer. Too much or too little will equally spoil the plate. Again, some plates will stand almost any amount of ammonia, but when an excess has been used, as in developing a plate that has received an "instantaneous" exposure, the negative is sometimes rendered so thin that no developer will bring it up to printing density. Again, when a solution of ammonia is made up in bulk, it soon loses strength by the evaporation of the volatile alkali, while the use of the dropping tube in the dark-room is decidedly a nuisance.

Solutions of the fixed alkalies, such as potash and soda, are free from these objections; they can be made up in bulk to any standard, and do not deteriorate by keeping. Common washing soda has been advocated by many, and certainly has advantages, not the least being its cheapness, and the fact that it is found in every household; but as it cannot be made up as a very concentrated solution, it is inferior to carbonate of potash, which is far more soluble, and, at the same time, possesses other advantages over carbonate of soda.

Mr. Beach's formula, as published in the PHOTOGRAPHIC NEWS, is as follows:—

No. 1.—*Pyro. Solution.*

Warm water	2 ounces
Sulphite of soda (chem. pure) 437 grains to the ounce	2 ,,

When cold, add—

Sulphurous acid	2 ounces
Pyrogallic acid	½ oz. of 218 grs.

No. 2.—*Potash Solution.*

A.—	Water	4 ounces
	Chem. pure carb. of potash (437 grs. to oz.)... ...	3 ,,
B.—	Water	3 ,,
	Chem. pure sulphite of soda (437 grs. to oz.)... ...	2 ,,

Combine A and B in one solution. Both the pyro. and potash solutions should be kept in well-stoppered bottles. To develop a whole plate that has had an "instantaneous" exposure, take 3 ounces of water, and add to it ½ ounce of No. 1, and 3 drachms of No. 2. This will usually bring out the image rapidly, and with full density. If necessary, more of No. 2 may be added, 1 drachm at a time, until the image appears. It will be noticed that the percentage of pyro. is very large—about 44 grains per ounce—and this proportion may, with most plates, be reduced with advantage, or the negatives will often be too dense for printing. In fact, when using a "10 times" plate for rapid work, it was found that half, or even less than half, the pyrogallic acid prescribed above was ample.

Processes.

COLLODION PROCESS.

Cleaning the Plate.—For polishing the glass plate use—

Iodine	1 drachm
Tripoli	3 ounces
Methylated spirit	1 pint

Collodionizing.—Care is to be taken that the back and edges of the plates are freed from dirt and dust previous to coating, and that the collodion film is allowed to set well before placing in the bath.

The Silver Bath, when compounded of pure nitrate of silver and distilled water, as a rule, will work well at once, but sometimes a trace of nitric acid is required so as to make the liquid slowly turn the colour of blue litmus to red.

Nitrate of silver	1 ounce
Distilled water	12 ounces
Nitric acid about 1 drop (if required)	

Developer.—The best and handiest method of compounding the developing solution is to keep a standard solution of the sulphate of iron.

Sulphate of iron	10 ounces
Water	20 ,,
Sulphate of copper	1 ounce

To make a twenty-grain developer, take—

Of the above	2 ounces
Glacial acetic acid...	6 drachms
Water	18 ounces

Alcohol is required to make the solution flow easily over the plate; about one ounce to each pint of developer.

More or less of the standard solution of iron is used as a stronger or weaker developer is required. In the case of under-exposure, a strong developer is very handy to bring out detail and promote harmony; for over-exposure the negative should be fixed, very thoroughly washed, and intensified afterwards.

In photographing a subject presenting violent contrasts, the use of a strong developer will tend to promote harmony in the negative, and on a subject where the general effect is flat, a weak solution will give a brighter picture.

Intensification is rarely necessary. But if, however, it is needed, subjoined are the formulæ:—

Pyrogallic acid	40 grains
Citric acid	20 ,,
Water	20 ounces

This solution will not keep long: it is to be used with a few drops of a thirty-grain solution of nitrate of silver added to each ounce.

Fixing may be accomplished in either cyanide of potassium, 20 grains to each ounce, or in hyposulphite of soda, 70 grains to each ounce; but if the latter be used, more copious washing is required than when cyanide is used.

Varnishing.—Take

Gum sandarac	¾ pound
Gum shellac	2 ounces

Place in a bottle, cover with absolute alcohol, allow to digest for two days; pour off the liquid portion into a Winchester, add more absolute alcohol, and again digest for three or four days, stirring or shaking occasionally; now add to that already in the Winchester; add one ounce of castor oil, shake well, and dilute by filling up the Winchester with methylated spirit; allow to stand, and settle. A Winchester is a stoppered glass bottle holding half-a-gallon.

See STANDARD FORMULÆ.

GELATINE PROCESS.

THE glass plates are well cleaned, and flowed with a preliminary coating of—

Syrupy solution of silicate of potash or soda	1 part
White of egg	5 parts
Water...	60 ,,

Beat to froth, and filter. The excess is drained off the plate, which is then placed in a nearly upright position till dry.

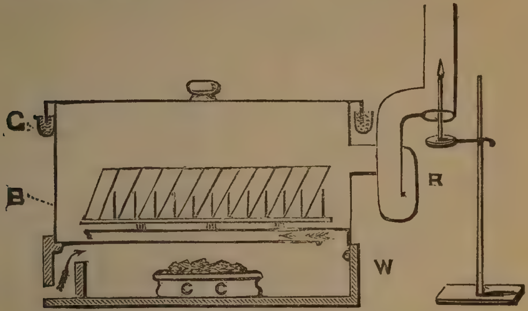
Emulsion.—A—Nit. silver 100 grains, dist. water 2 oz. B—Bromide potassium 85 grains, Nelson's No. 2 gelatine 20 grains, dist. water 1½ oz., a one per cent. mixture of hydrochloric acid, and water 50 minims. C—Iodide potassium 8 grains, dist. water ½ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for a period determined as described below, and stir in D. After washing, add ¾ oz. alcohol.

To emulsify, pour the solution B into a glass bottle; afterwards add, little by little, the nitrate of silver solution (No. 1), both solutions having been raised to a temperature somewhere approaching 120°F., and C is next added. The whole is then poured into a large beaker or jelly-can; this is covered with a cover consisting of a wooden dish, and placed in a saucepan. The lid of the latter is put on, and the whole is allowed to boil. A plate is now coated with the emulsion. It will be seen that, on looking at a light through the plate, the light appears ruby red. The emulsion is said to be "red by transmitted light." As the process goes on, however, the colour changes, and at last it becomes blue. It is difficult to say exactly when the whole of the bromide of silver has been converted into the blue variety, but it may be discovered by gently drying a plate coated with the emulsion. The blue bromide and the red bromide will separate into patches. When all is converted to the blue, the boiling may cease. The time taken in boiling seems to vary considerably with different manipulators; it is generally somewhere between one and two hours; but it has been frequently boiled for several hours without producing fog, so long as the emulsion was kept distinctly but slightly acid. The bulk of gelatine is then added, and the whole poured out in a flat dish to set. When it is set quite stiff, it is cut up and placed in the "squeezer." It is pushed through wire guaze or canvas into a hair-sieve held under water. This cuts it into very small particles, and, if water be allowed to run through the sieve for half-an-hour, the soluble salts will all be washed away.

After this, the sieve is allowed to stand a short time, for some of the water to drain off. The emulsion is then heated, is filtered through two folds of a pocket-handkerchief, and is spread on the glass. For this, a small teapot may be used as a pourer—a teapot holding four ounces—and this will just coat a dozen half-plates.

Dr. Herman Fol supplies the following hints on the subject of drying and washing plates:—

A Drying Box for Gelatine Plates.—The first time I prepared my own gelatine plates, I borrowed two drying-cupboards in order to dry them, but, after examining these rather cumbrous apparatus, each far too large to be put in my dark-room, I grew rather suspicious about their real darkness, and so began by putting a plate in each, and I left them to stand a few hours in broad daylight. After this I withdrew the plates with due precautions, and upon applying the developers found that both were considerably fogged. My emulsion was ready, and seemed good. What was to be done? I had at hand a large zinc case with a lid of the same material, so I cut a long opening at one end of the bottom, and had another bottom soldered inside with an opening at the opposite end (see diagram). I then had a so-called Russian chimney fastened on one of the sides, and fitted this with a gas-flame placed as shown, so that it might produce the necessary current of air. To make the cover fit air and light-tight was rather more difficult. This, however, I managed in the following manner. I had a rim soldered all round in the shape of a gutter, the edge of the lid sinking into the bottom of the gutter, and I then filled the latter with small shot, and thus obtained a most perfect closure. This box has been in use ever since, and, with the addition of a wooden tray, and of an iron vessel full of calcium chloride, has done me very good service. I should not have mentioned so insignificant a circumstance were it not that it led me to a method of shutting out light and air that seems to be new, and might be of service to one or other of our confrères.



B, zinc case ; G, gutter filled with shot ; W, wooden tray ; CC, calcium chloride vessel R, Russian chimney.

Washing Gelatine Emulsion.—I am much surprised, when reading photographic papers, to see what rough appliances are often recommended for performing delicate operations with the most fickle of all materials—viz., gelatino-bromide emulsions. None of us would use anything but porcelain vessels of suitable form for most domestic purposes, but as soon as photography is concerned, many are content with materials such as string, earthenware, canvas, and the like. Now a good apparatus means saving of time, certainty in the operations, and the avoidance of endless annoyances. I have tried the different methods proposed for cutting up and washing my emulsion : forcing it through canvas, and other rough and unsatisfactory appliances ; cutting it up with a silver fork won't do, because the instrument tears rather than cuts.* I prefer a small roller with a number of sharp silver discs, set up about a quarter of an inch apart (fig. 2), and all mounted by means of silver copper-wire to a wooden handle. The discs are easily obtained by thinning out and sharpening small pieces of money. Having poured out the emulsion in a large porcelain tray, and let it set thoroughly, I pour clean water over it, and by rolling the above instrument to and fro, easily cut it up in long strips or ribbons. For washing, I tried the washing-bottle system, but some pieces of emulsion stick to the bottom of the bottle, and don't get washed at all, so I tried suspending it in a muslin bag in a vessel through which a stream of

Fig. 2.

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* I have not tried forcing the emulsion through an iron grating, nor do I intend to do so as the contact with metallic iron is too great an outrage to my sense of what is suitable.

running water circulated. This is good, but very slow, and it is disagreeable to have to scrape the washed emulsion off the cloth, to which it adheres. Leading the water directly into a canvas bag containing the emulsion is the worst of all methods, since the emulsion is apt to fill the pores of the cloth, and stop the flow of water, so that this frequently overflows, and causes other accidents. At last I procured a porcelain vessel pierced with numerous small holes—I might almost call it a porcelain basket. This I placed in a large stoneware jar with an arrangement for filling and emptying automatically with water (fig. 3). The emulsion, cut up into ribbons, being placed in the porcelain basket, is easily and thoroughly washed without clogging the holes, since the water passes them alternately in opposite directions, and the operation of draining and collecting the emulsion is comparatively an easy matter. I find, by the way, that two parts of Simeon's Swiss gelatine, and one part of Nelson's No. 1, give a jelly that retains exactly its original volume, even after forty-eight hours' soaking in cold water. Simeon's gelatine alone under the same circumstances loses a part of its water, and contracts to a smaller volume. My washing apparatus much resembles a common sponge-holder. Does not emulsion washing deserve a special vessel as well as the drying of a sponge? And if so, is it so very difficult to get a maker to alter the size and shape of his sponge-holders, and supply photographers with a most useful appliance?

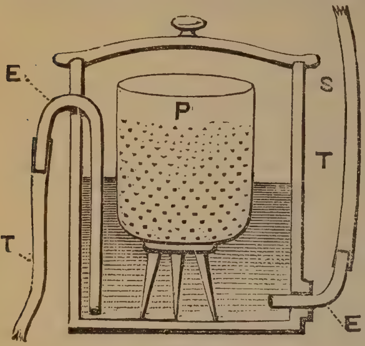

Fig. 3.

S, stoneware jar; E E, ebonite pipes; T T, india-rubber tubing; P, porcelain bashet filled with emulsion cut up into strips.

Herr Obernetter, of Munich, has recently succeeded in producing good emulsion, by mixing his gelatine direct with nitrate of silver solution, allowing it to set as a jelly, and in this form (cut up into shreds) introducing it into a closed apparatus. A solution of bromide salt is then poured upon the gelatine, allowed to remain for three or four hours, and run off. Finally, water is run through the apparatus to wash, and the emulsion is ready. Nearly all the operations can therefore be done in daylight.

Mr. Vero C. Driffield has worked the Obernetter process, and, by employing a strong and fresh hyposulphite solution, obtained plates free from fog. The plates are, however, not very rapid. He says briefly:—I dissolved 1·5 gramme of gelatine and 1·5 grammes nitrate of silver in 20 c.c. of water, and allowed to set. I then broke up the jelly with a silver fork, and poured over it 2 grammes bromide of potassium dissolved in sufficient water to cover the mass. I left this standing for three hours, poured away the liquid, and washed the set emulsion for another three hours. I then dissolved the emulsion, made up to 30 c.c., and coated.

See STANDARD FORMULÆ.

GELATINO-CITRO-CHLORIDE EMULSION FOR PAPER OR OPAL.

For a small quantity we take eighty grains of hard gelatine, and dissolve it by gentle heat in one and a-half ounces of distilled water; into this we pour a warm solution of silver nitrate, seventy-five grains in half-an-ounce of distilled water. We have previously taken the precaution of well drying a little sodium chloride and a little potassium citrate, and of each of these salts we take twenty-one grains, and mix them in half-an-ounce of water, dissolving by heat. This mixture we pour gradually into the warm gelatine and silver, stirring all the time, and then pour out the emulsion thus made into a small dish to set.

We prefer working in yellow light at this point and onwards, though a distant gas-light is no doubt harmless in such a process. When the emulsion is set, we take a basin of water and a piece of mosquito net, and squeeze the jelly through the latter into the water, keeping the hands below the surface, because this emulsion is much more easily melted by the heat of the hands than a firm gelatine bromide. After five minutes, with an occasional stir, the water is poured off, and the basin filled up again. In another five minutes the water is again poured off, and the emulsion is thrown on to muslin stretched over some vessel, and allowed to drain for half-an-hour, when it can be melted up at a low temperature. Two drachms of alcohol must be added in which three grains of salicylic acid are dissolved, and one grain of chrome alum dissolved in a little water by heat. Upon filtering it through some fine material, such as two folds of cambric, the emulsion is ready for coating the plates or paper.

Printing should be carried on as deeply as in the case of albumen prints, and vignetting should be done either on a turn-table, or by frequently moving the frame to different positions. Toning we succeed best in accomplishing in a borax bath.

See Standard Formulæ.

An alum bath for five minutes secures immunity from frilling; but it must be clean. Fixing in a twenty per cent. hypo bath for at least ten minutes completes the operation, and washing must of course be thorough.

SILVER PRINTING ON ALBUMENIZED PAPER.

The Silver Printing Bath.—Without doubt the best results are obtained from the use of a plain neutral solution, kept as near as possible to its full strength, varying from forty-five to sixty grains of nitrate of silver per ounce of water, and kept as near neutral as possible by means of carbonate of soda, and floating from three to five minutes.

To prepare a sensitive paper that keeps white for a week or so, nothing has been published that works so well as Mr. Blanchard's formula, given in April, 1879, and is as follows:—Prepare the silver solution, sixty grains to the ounce, and be careful not to allow it to sink lower than fifty grains to the ounce; for each ounce of nitrate used, add ten drops of a saturated solution of citric acid; now add nitric acid drop by drop, until the slight precipitate of citrate of silver formed is just re-dissolved. Float from three to five minutes, and upon taking from the bath, place between sheets of clean blotting-paper, which may be used over and over again until their power of absorption is almost destroyed, it being needless to observe that when this stage is reached, the blotting-paper is especially available for the silver waste basket. Paper so prepared has been kept white and good for nine months, and the results, both in the way of the fine, rich, vigorous prints, and ease of toning, leave nothing to be desired.

Toning.—The acetate of soda toning bath still holds its own against the many formulæ for toning that have from time to time been published; and deservedly so, as by its use the utmost range of tone can be secured at will, and if the silver be carefully washed out of the prints previous to toning, the acetate bath will keep in order for a considerable length of time, improving in quality with age, if properly strengthened, and not overworked.

For views, a handy and good toning bath is made by neutralising the chloride of gold with chalk, and using it in the proportion of one grain of gold to ten ounces of water; the formula for the acetate of soda bath being—

Chloride of gold	1 grain
Acetate of soda	30 grains
Water	10 ounces

Another method, of great ease in preparation and uniformity of action, is given by Mr. Werge; it will be found amongst the Standard Formulæ.

Washing the print after fixing is a very important factor in securing lasting prints, and always receives a deal of attention from the careful photographer.

Constant changes of clean water for two or three hours will more effectually cleanse the prints than twelve hours' soaking. A very delicate and ready test for the elimination of soda is given thus in Abney's "Instruction in Photography"* :—

Potassium permanganate	2 grains
Potassium carbonate	20 ,,
Water	1 quart

The addition of a few drops of this rose-coloured solution to a pint of water will yield a slightly pink tinge. If there be any trace of hyposulphite present, this will give place to one of a greenish hue.

See STANDARD FORMULÆ.

Quite recently Dr. Liesegang has pointed out that collodio-chloride prints may be fixed by leaving them for rather over an hour in a saturated solution of chloride of ammonium, and by the addition of a very small quantity of ammonia, the fixing power of the bath is increased. Liesegang's method of fixing seems to involve the use of less gold for toning, and shortens the time of exposure in the printing-frame.

CARBON PRINTING PROCESS.

CARBON prints are produced by either single or double transfer; by single transfer when a reversed or special negative can be obtained; double transfer when ordinary negatives are printed from. In either case the carbon tissue used is the same.

Carbon tissue is paper covered on one side with a layer of pigmented gelatine, consisting of gelatine, sugar, ammonia, and carbolic acid, with which is mixed various pigments to give the desired colour; for example, purple tissue is compounded of the above gelatine mixture, coloured by the addition of crimson lake, vegetable black, and indigo; whilst the further addition of Vandyke brown will give a purple brown (formulæ for tissue on p. 201).

Single transfer paper is paper coated with a layer of gelatine made nearly insoluble by the addition of chrome alum.

Double transfer paper. The gelatine coating in this case is partially soluble, and has the addition of chloride of barium and sulphate of soda, to give body and whiteness to the paper, the barium and soda forming an emulsion by the formation of barium sulphate.

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* Piper and Carter, 5, Castle Street, E.C.

Carbon tissue is sensitized by immersion in—

Bichromate of potash	1 ounce
Ammonia	5 drops
Water	20 ounces

for two or three minutes. After removal, the tissue may be hung up to dry at once, or may be laid face down upon a piece of clean glass, and the superfluous moisture removed by the gentle application of the squeegee to the back of tissue. In hot weather this method should always be adopted, and the bichromate solution be kept cold.

The time occupied in drying carbon tissue has a material difference upon its after behaviour; if dried too quickly (providing the pigmented gelatine is not melted), the tissue will be brittle, will print slow, and be deficient in half-tone; if too long in drying, it will most likely become insoluble and useless. Tissue after sensitizing must be dried in from five to ten hours in a printing room where there is a constant current of pure air. Negatives for carbon printing require a mask or edging of black varnish, technically called a safe edge, so that the outside edge of the tissue is protected from the action of light.

The exposure under the negative is about twice as rapid as silver paper, and as the progress of printing cannot be watched, as with silver paper, recourse has to be had to an actinometer. The actinometer in general use is Johnson's single tint, a square box containing a roll of sensitized silver paper, the lid carrying a square of glass painted over with a dark chocolate pigment, except a small slit about the centre; under this slit the silver paper is held, and upon exposure to light darkens to the colour of the paint round the slit. When it is reached, this is called one tint, the paper is pulled forward until a piece of unexposed paper is under the slit, when the same operation is repeated until sufficient exposure has been given; experience soon enables the printer to tell how many pints each individual negative requires, and with practice few or no mistakes are made.

The exposure being complete, the image requires development, and here one of the peculiarities of the carbon process asserts itself, as this development must take place from the back, to enable which to be done the print is cemented down upon the paper intended as temporary or permanent support. This is done by soaking the exposed tissue and piece of single transfer paper (a little larger than the piece of tissue) in clean cold water until the tissue, which upon first immersion curls inwards, begins to exhibit a tendency to flatten out. At this stage the two pieces are placed face to face, lifted out of the water, and the squeegee applied vigorously to the back of the tissue. After being allowed to lie between sheets of blotting-paper for a few minutes, the tissue, mounted upon its support, is placed in warm water at 100° F., and in a short time the backing paper can be stripped off and thrown away; now, by gentle laving of the hot water, or pouring from a jug the pigmented gelatine, unaltered by the action of light, is gradually washed away, leaving the carbon image upon the paper, which, after rinsing in cold water, immersion in a solution of alum, and again rinsing, is hung up to dry.

For double transfer from Sawyer's patent flexible support a piece a little larger is carefully smeared over with a solution of beeswax in turpentine, applied with a piece of soft flannel, and polished off with another. The waxed support is now placed in cold water with the exposed tissue, and treated as described above for single transfer. With single transfer, when the developed print is dry, it is ready for mounting on cardboard; but when developed upon Sawyer's temporary support, the picture needs transferring to its final support, which is effected by soaking a piece of double transfer paper in warm water at about 90° to 120° F. until the surface feels quite slimy and soft, the piece of temporary support carrying the developed image in the meantime being soaked in cold water; the two are brought into contact, laid upon a smooth surface, transfer paper uppermost, and the squegee applied gently. Now hang up to dry. When quite dry, the two papers are separated, the image being attached to the transfer paper, leaving the temporary support clean and ready to be waxed and used again. Instead of transferring to double transfer paper, the carbon print may be transferred to ivory by immersing the ivory and the print in a warm five-grain solution of gelatine, and squeegeeing into contact; remove all traces of superfluous gelatine with a sponge, and place between blotting-paper upon a weight to dry, when the support is stripped away, leaving the image upon the ivory.

The surface of a carbon print transferred from Sawyer's flexible support is either matt, or with a slight glaze; if a high glaze be desired, the carbon image is developed upon a piece of glass polished with French chalk, and coated with thin plain collodion. The collodionized plate is now washed in cold water until greasiness disappears, when the exposed tissue is mounted upon it; but before applying the squeegee, a piece of india-rubber cloth, or a piece of single transfer paper, is laid over the plate, so as to protect the collodion from the action of the squeegee. The subsequent operations involved are the same, unless the mounted picture be desired to have an enamelled surface, in which case, when the transfer paper backing is nearly dry, it is smeared with thin glue and a piece of thin cardboard rubbed in contact, and placed under a weight to dry: when dry, the whole is stripped off, the result being a highly-enamelled carbon picture. When a reversed negative can be obtained, opal glass may be used as the support, instead of single transfer paper, proceeding in the same way as when that article is used; and the resulting pictures may be considered as amongst the most beautiful of photographic pictures.

For making enlarged negatives, carbon transparencies are the best. For transparencies in carbons a special tissue is used, the colouring matter of which is Indian ink specially ground and carefully filtered. This tissue is sensitized in the usual way, and, after exposure, which must be two or three times more than that for an ordinary carbon print, the edges are turned up so as to form a tray, when the surface is coated with thin normal collodion (perfectly clean and free from dust) and hung up to dry. When dry, it is immersed in cold water, and squeegeed down upon a piece of glass previously coated with—

Gelatine	100 grains
Bichromate of potash	20 „
Water	1 pint

After the plates are coated and dried, they are exposed to light, so that the coating may be made insoluble. After mounting upon the gelatinized glass, the image is developed by immersion in hot water at 100°, and after stripping the backing paper by pouring hot water out of a jug or kettle, there is more certainty in getting the image free from grit than if allowed to lie still in water until developed. When the development is complete, the transparency only requires washing under the tap with cold water, when it is placed away to dry in some situation free from dust.

See STANDARD FORMULÆ.

IRON OR CYANOTYPE PRINTING (BLUE PROCESS).

No. 1.—Ammonia citrate of iron	2 ounces
Distilled water	8 "
No. 2.—Ferricyanide potas	2 "
Distilled water	8 "

Mix the two solutions, and keep in a darkened bottle. Take unglazed paper of a fine grain, and damp the sheets you propose to sensitize. With a sponge or rubber brush float the solution over the paper as evenly as possible, and hang to dry in a darkened room. Do not prepare a larger quantity than you are going to shortly use, as the paper becomes slower by keeping. When printing, expose until the shadows assume a strong metallic grey colour, and detail begins to be lost. Wash well in cold water until, when held up by the corner, the drip from print shows no yellow tinge. If it is desired to write on the print, use a saturated solution of common washing soda as ink, and a clean steel pen to write with.

BLACK PROCESS WITH IRON.

THE method of Colas for copying tracings in black lines on a white ground.

A hard well-sized paper is coated with the following preparation :—

Water	300 parts
Gelatine	10 "
Perchloride of iron	20 "
Tartaric acid	10 "
Persulphate of iron	10 "

When dry, the paper is exposed under the tracing until the greenish-yellow tint of the paper has disappeared, except where covered by the opaque lines. Development is effected in a bath made by dissolving 20 parts of gallic acid in 200 parts of alcohol, and adding 1,000 of water. Fixation by simply soaking in water as in previously described process.

PHOTO-VITRIFIED ENAMELLING PROCESSES.

DR. LIESEGANG has published the following for producing enamels by the dusting-on process. A good sensitizing composition may be thus made:—

Water	100 parts
Moist sugar	10 "
Gum-arabic	10 "
Bichromate of ammonium	4 "

This solution should be used within one or two days of its preparation, and ought to be filtered with the most scrupulous care, as any particle of dust or fibre is likely to cause a white spot on the finished work. The solution is poured on the glass plate after the manner of collodion, and after the plate has been held in a tolerably horizontal position for a few seconds, the excess of solution is quickly poured off, and the plate is set to dry on a kind of desk formed of a piece of sheet iron mounted at an angle of about 15° with the horizon, and kept warm by a spirit lamp placed underneath ; but it is advisible to distribute the heat by means of a few layers of blotting-paper placed under the glass, and the heat should not rise above a temperature which the hand can easily bear. It is best to use patent plate-glass, and the greatest care must be exercised in cleaning it thoroughly. It is necessary that the positive under which the exposure is made should be quite dry, or even slightly warm; and in ordinary cases an exposure of one minute in sunshine, or ten minutes in diffused daylight, will suffice; but an actinometer should be used as in carbon printing. As soon as the exposure is finished, the plate is taken into the dark room, placed on a white surface, and some of the enamel colour is sprinkled on and worked round about with a long-haired camel-hair pencil, both the powder and the brush being perfectly dry. The image now gradually develops, and it is often necessary to shake the powder from off the plate and allow the moisture of the air to act on the film for a short period, after which the treatment with the enamel pigment is resumed. Should the picture appear hard, only the extreme dark shades appearing, the exposure has been too long; but if the image is flat, and all the high-lights are veiled, under-exposure is indicated. Just as in ordinary silver printing, the image should appear a few shades over dark at this stage, as the enamel colours lose a little intensity when fired; but if there should be any difficulty experienced in attaining the required vigour, it is advisible to very gently breathe on the plate—previously freed from all loosely-adhering powder—and then to proceed with the development. When the development is finished, all non-adherent powder should be removed by means of the brush, and any required retouching can be performed either by breathing on the plate and cautiously applying the pigment on the part requiring it, or by removing the pigment by friction with a tuft of cotton-wool or a stump. The plate is next coated with a collodion containing from 1½ to 2 per cent. of pyroxyline, and about ⅓ per cent. of castor oil; and after the film has set it is cleared away from the edges of the plate so as to leave a clear border of about ⅛ of an inch. The collodionized plate is next soaked in a two per cent. solution of caustic potash until all traces of soluble chromium salts are removed from the film, and after a thorough rinsing in clean water the plate is immersed in water containing enough nitric acid to make it taste about as sour as weak vinegar, where it should remain for some hours. By now placing the glass bearing the film in a large vessel containing clean water, and gently manipulating the pellicle with the fingers, it becomes easy to detach the collodion film, which is then caught, collodion side downwards, on the enamel tablet or tile. Should it be necessary to vitrify the picture with the collodion side upwards, the final transfer must be made in a solution of sugar containing one-fifth of its weight of this material, as otherwise the collodion film would be liable to scale off. In this latter case, the collodion must be dissolved away before firing; but when the collodion film is mounted downwards on the enamel plate or tile, this proceeding is not necessary. The most convenient method of dissolving away the

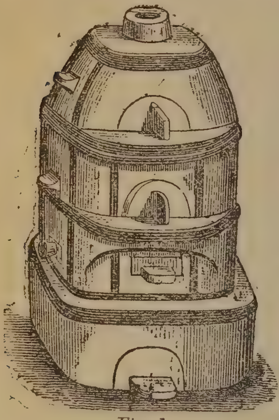


Fig. 1.

collodion film is by soaking the dried plate for a whole day in the following mixture :—

Alcohol	50	volumes
Ether	50	,,
Oil of lavender	100	,,
Oil of turpentine	3	,,

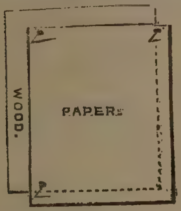
The plate having been again retouched, if necessary, all is ready for the final operation, or the burning-in of the image.

For this purpose, some kind of a muffle furnace is required, and, in many cases the portable muffle furnaces for coke, such as we figure in the diagram, will be found convenient. These furnaces can be obtained without difficulty in London, most dealers in jewellers' materials keeping them in stock. It will often happen, however, that the photographic enameller will prefer to avail himself of the superior advantages and convenience of gas as a fuel for heating the muffle, and, in this case, the excellent furnaces manufactured by Mr. Fletcher, of Warrington, may be adopted.

COLLODIO-CHLORIDE PROCESS ON PAPER.

Mr. Bruce, of Duns, for the past fourteen years has worked the process with most perfect success.

The collodio-chloride paper comes from Germany, and may be obtained either of Herr Obernetter, of Munich, or Herr Linde, of Lübeck, carefully packed in zinc tubes, and will keep good in a cool place for two or three months ; or it is easy to prepare it oneself, the following directions by Dr. Liesegang being thoroughly practical :—In a glass beaker dissolve 8 grammes of nitrate of silver in 6 of distilled water, by heat. Drop this solution in a bottle containing 35 cub. cent. of alcohol. In cold weather it is better to put the bottle in a vessel with warm water. Then add 8 grammes of soluble cotton, and after thorough shaking, 160 cub. cent. of ether: on further shaking, a greyish-white collodion will form itself. In another bottle dissolve 1 gramme of chloride of lithium in 35 cub. cent of alcohol, together with one gramme of tartaric acid. This solution is to be dropped into the argentiferous collodion, which must be shaken all the time. This collodion will keep for any time if preserved in a well-corked black bottle, or in a fitting dark cover.



Have a thin piece of wood, same size as the paper that is to be coated, with a knob fastened at the under side. Pin the Lichtdruck-paper on it at three of the corners, so that the right and below edge look a little over the wood (this will cause the collodion not to run under the paper), and the left edge of the paper may be turned up a little, but this will not be found necessary after a little practice.

Now keep the wood with the left hand at the handle, as you would take a glass plate fixed to a pneumatic plate-holder, and pour the collodio-chloride upon the paper just as you would coat a glass plate with collodion. Having returned the surplus of the collodion to the bottle, take the pins away, and hang the paper to dry. The paper will keep for some weeks. Some prefer to use a pink-coloured Lichtdruck paper, whose colour will obliterate any trace of yellow that might form by keeping it for a longer time. An enamel paper, such as that sold by Corfield, of Bride Street, can be used instead of the Lichtdruck paper.

The printing should not be so deep as when using albumenized paper, as collodio-chloride prints lose very little of their vigour in passing through the toning and fixing baths.

Collodio-chloride prints may be kept a considerable time before toning—two or three weeks may elapse—but Mr. Bruce prefers toning as soon after printing as possible.

The toning bath is made as follows :—

Stock Solution.—No. 1.

Sulpho-cyanide of ammonium	1 oz. 2 drachms
Distilled water	60 ounces
Hyposulphite of soda	9 grains

Stock Solution.—No. 2.

Pure gold...	11 grains
Or	
Chloride of gold	22 grains
Distilled water	60 „

Fixing Bath.

Hyposulphite of soda	1 ounce
Distilled water	12 ounces

The reason in the first case is, that the prints pass so rapidly from brown to black, that before you can well get them removed from the bath, the point where richness lies is often lost. And in the second place, the sulphocyanide of ammonium solution in some measure destroys the transparency and purity of the prints when they are left too long in contact with it. Particular care and attention must then be given to the toning bath, so as to have it neither more nor less than the strength stated, as collodio-chloride photographs are much easier stained in toning, than prints upon albumenized paper; and when unequal toning does take place, it is more visible in the former than in the latter.

In making up a bath, equal quantities of No. 1 and No. 2 are mixed, plenty of chalk being added, letting the whole stand for from three to five hours before use.

With some samples of this paper, the bath can be used at once ; but with other sheets this is not the case, a deposit of gold taking place over the whole prints, and destroying the purity of the whites. It is better, therefore, to err on the safe side by making up the bath a considerable time before it is required, and thus be assured of having a uniformity in one's photographs.

When I have many prints to tone, I use two flat dishes capable of holding, say, a dozen prints each. I filter the solution into these dishes to a depth of one-fourth of an inch; were the liquid deeper the prints would not keep flat. I wash in three changes of water; and as the prints generally curl up into tubes, I open each of them separately in the water so as to get the surface uniformly washed. If this is not done, and done in each separate dish of clean water, uneven toning will be sure to take place.

When the prints have been properly washed with a quick, but gentle movement, I open up each picture, and lay it flat on the bath face downward: and when the dish is full, I begin at the first and turn it over, brushing the face with a camel-hair brush, and continue the process until the whole have been so treated, afterwards turning them back into their former position, and so on without cessation, until the prints are ready to leave the bath. When stains occur in the course of toning, lift the print out of the solution, dip the brush in alcohol, and rub the spot slightly. Then immerse the print again, when it will be found that the stain has disappeared, and the print has been saved.

When fixing the prints, the same care is required to lay them separately in the fixing solution, turning them over, and keeping them in motion until they are fixed, which is completed, when the fixing bath is new, in from three to five minutes. When removed from the bath, the prints are immersed for a few minutes in three or four changes of water, and put under the tap for an hour or two. The water is then shut off, and they are left all night, and thoroughout the next day until the afternoon ; the water is changed now and again. The prints are then trimmed and mounted.

The system in use, among many of the profession, of cutting the prints to the exact size wanted before toning them, cannot be readily adopted with collodio-chloride pictures. In their case the paper should always be a little larger than is necessary, allowing not less than one-eighth of an inch to be cut off all round after the prints have been toned, fixed, and washed. The reason for this is that the edges of the prints are very curly, and the film becomes frayed in the course of washing; by cutting away this frayed curly part, they are more easily and neatly mounted. As it is impossible to lay these prints upon blotting-paper, and dry them in a flat state without cracking the surface, another method has to be put in practice for the purpose of trimming them. I use a piece of thin plate-glass, cut to the exact size of what the carte-de-visite print should be, the edges being ground and the corners slightly rounded, so as not to scratch the picture. If the prints are more than ordinarily curly, I open them *underneath* the water, and lay the sheet of glass upon the face, and then lift both of them out of the water at once, the moisture between the two enabling me to move and adjust the glass over the print with the greatest ease. I then, with a pair of long-bladed scissors, cut along the four edges of the glass, and thus secure a straight clean-cut print, without damaging the surface of the photograph.

A sheet of thick plate glass is covered with a damp cloth, and the prints are lifted from the dish and laid upon it in a wet condition, the water on the face of the prints and the damp cloth preventing them from curling. They are then pressed quite flat with another cloth, and dried before they are starched. The medium should be carefully boiled, and as thick as possible.

See STANDARD FORMULÆ.

THE PRETSCH PROCESS FOR MAKING PHOTO-TINT BLOCKS FROM ORDINARY NEGATIVES.

1 Dissolve 1 ounce of Coignet's gold label gelatine in six ounces of distilled water, and to 1 ounce of this solution add 30 grains of nitrate of silver, previously dissolved in ½ ounce of distilled water ; to the other 5 ounces of glue solution add 2 ounces of a saturated solution of bichromate of potass, and while warm, add to it the nitrate of silver, and mix well ; then stir in 100 grains of crystallized chloride of calcium, and add 150 grains of glycerine.

2. Level a glass plate and pour over it as much of the above solution as will, when quite dry, form a film about the thickness of thin writing paper.

3. Now expose the plate to sunlight under a negative for about three hours,

or until all the details of the picture appear when viewed by transmitted light.

4. Then wash it under water until those parts of the picture which are the least acted on by light become granulated, which is caused by a peculiar contraction of the film; the superfluous moisture must then be removed by blotting-paper.

5. A mould in gutta-percha or sulphur, taken from the film, and a reproduction of this mould, made by electrotyping or stereotyping, is the typographic block required.

PAVLOFFSKI'S NEW METHOD OF MAKING ENAMEL PHOTOGRAPHS.

Twenty-five parts of the best picked gum-arabic are soaked for two or three days in 100 parts of distilled water, or in water previously boiled to dispel as much of the air as possible. When dissolved, the gum water is strained through a linen cloth into an evaporating dish. Now take from 16 to 20 parts of vitrifiable pigment, if for transfers to be burnt in, or of calcined lamp-black if for transfer to wool, canvas, &c., or for other similar purposes. The pigment or lamp-black must be very carefully ground upon a marble slab or a sheet of ground glass with a few drops of the gum solution; then there is added, by degrees, 7 parts of crystallized honey. The latter is then stirred into the gum water, and when thoroughly incorporated, 6 parts of bichromate of potash are added, previously dissolved in a little hot water. This mixture, now sensitive to light, is well stirred with a glass rod, and filtered three times through flannel, and finally through dry cotton-wool. This solution can be preserved for nearly a week in a dark place.

Patent plate glass, which has previously been cleaned with a weak solution of soluble glass, or received a preliminary treatment with lump-sugar-water, is coated as may be required with the above solution heated to about 190° F. to dispel any air-bubbles it may contain; but these prepared plates do not keep more than two days.

It is not necessary to regulate the thickness of the film by measuring the quantity of solution, but merely pour a pool of it on the centre of the plate, and allow it to flow all over like collodion; drain the superfluous mixture off at one corner, and place the glass in a horizontal position to dry.

A marble slab heated with hot water, or a drying cupboard, will answer for drying on, provided that the temperature at which the plates are dried is between 100° and 120° F. Half-an-hour suffices for their complete desiccation. While yet warm, the plates are exposed, the negative being also slightly warmed, and as an extra precaution, the latter should be dusted over with French chalk to prevent it adhering to the sensitive surface. If the negative is not quite flat, thin sheets of mica will be found preferable to plate glass as a support for the sensitive compound.

About one-fifth of the time necessary for a silver print is ample exposure—better more than less, as the development can always be forced in cases of over-exposure; but hard pictures are inevitable if the film is under-exposed.

After removing the impressed film from the printing-frame, coat it with a two per cent. normal collodion, and when this is thoroughly set, pour a stream of cold water gently over it. In a few moments the collodion commences to blister; when this happens, take a piece of paper the same size as the plate (but not highly sized nor very thick), and place it, after soaking in water, on the collodion. Then, with a needle, or the point of a pen-knife, detach the film from two edges of the plate, and raise the corner very carefully. The collodion, carrying the partly-developed picture, will adhere to the paper, and can be stripped off and laid film upwards on a clean glass plate, when it is gently sluiced with cold water until it is nearly free from the soluble or unexposed mixture. This particular moment must be carefully watched, and the development retarded by pouring over the impression very dilute spirit (20 parts alcohol to 100 of water); afterwards flood with equal parts of spirit and water, and finally pour on a small quantity of absolute alcohol,* which will completely arrest further development, and the picture is ready for transferring.

Next comes the transfer. To do this, take the enamel tablet, and lay the picture, face upwards, on the reverse side of it. Having chosen the position the picture is to occupy, cut round with a pair of scissors close to the edges: then wipe the surface of the tablet, and coat it with a mixture of 1 part of thick gum mucilage to 3 parts of weak spirit. Pour a little of the same mixture on to the picture, and with an adroit movement reverse the picture so as to bring it on the surface it is intended to occupy, slightly pressing it with a linen cloth or towel: the drying can be accelerated by heat.

To wash off the collodion, equal parts of alcohol and ether are used at first, and afterwards acetic ether alone; this dries quickly, but previous to firing, a glaze is applied in the following manner:—A pad, or dabber of wool, is made, covered with a layer of silk; with this pad you gently apply a very thin and even coating of varnish, prepared with oil of lavender, thickened essence of turpentine, and an easily fusible glaze, the whole being about the consistency of cream.

Another way of applying the glaze is to dab the picture over with the varnish, and dust the glaze over the tacky surface, either from a wide-mouthed bottle with three folds of muslin tied over it, or by using a box like that for strewing powdered resin over copper plates to make aqua-tinted grounds for etching purposes.

Lieutenant Pavloffski has also adopted the simpler method of spreading the mixture of gum and enamel colour on paper rather than a plate of metal, and he prefers to sensitize afterwards instead of mixing the bichromate with the gum in the first instance. A mixture of gum and pigment is made precisely as described, only the bichromate is omitted, and rather less water is used. This gum mixture is spread evenly on stout paper, dried, and is sensitized just like ordinary carbon tissue; but it is necessary to use a bath containing alcohol in order to prevent the dissolving of the gum. The following is the formula:—Potassium bichromate, 2 parts; water, 50 parts; 90 per cent. alcohol, 50 parts. The remaining operations are similar to those in the ordinary Swan's carbon process, only alcohol must be used when required to prevent the solution of the gum. For coating the paper, a gumming machine may be used.

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* These solutions should be kept ready in three stoppered bottles.

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Standard Formulæ and Memoranda,

STANDARD FORMULÆ.

MEMORANDA.

MAKING GELATINO-BROMIDE PLATES.

See PROCESSES.

Usual Pyro Developer.

No. 1—	Strong liquid ammonia ...	1¾	ounces
	Bromide potassium ...	240	grains
	Water	80	ounces
No. 2—	Pyrogallic	30	grains
	Water	10	ounces

In case of an ordinary exposure, mix equal volumes.

Beach's Developer.

Pyro Solution.

Warm distilled water ...	2 ounces
Sulphite soda (chem. pure)	2 ,,

Dissolve; and when cold, add—

Sulphurous acid	2 ounces
Pyrogallic acid	½ ounce

Potash Solution.

A	Water	4 ounces
	Carb. potash (chem. pure) ...	3 ,,
B	Water	3 ,,
	Sulphite soda (chem. pure) ...	2 ,,

A and B are now combined into one solution, which will measure between eight or nine fluid ounces. To develop an 8½ by 6½ plate which has had a drop-shutter exposure, take water three ounces, and add thereto half an ounce of No. 1 and 3 drams of No. 2 of the potash solution, increasing the latter to 5 drams in case the image hangs back. For a plate which has had the proper exposure, or which has been somewhat over-exposed, add to the 3 ounces of water 3 drams of No. 1 and 1 dram of No. 2. After a minute's time, if the image fails to appear, add a second dram of the potash, repeating the additions at intervals of a minute until developing commences.

Oxalate Developer.

No. 1. Saturated solution of neutral oxalate of potash. To 1,000 parts of this add 3 parts saturated solution of bromide of ammonium.

No. 2. Saturated solution of sulphate of iron. To 1,000 parts of this add 2 parts saturated solution of tartaric acid.

For use, take 4 parts of No. 1, to 1 part of No. 2. If picture is under-exposed, add a little more of No. 2.

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The Old Sulphite Developer.

No. 1—Sulphite of soda	4 ounces
Water	40 ,,

Dissolve; then add sufficient of a saturated solution of citric acid to produce a slight acid reaction upon litmus paper; now add one ounce of pyrogallic, and make up bulk to 54 ounces with water. This gives a solution each ounce of which will contain about eight grains of pyrogallic.

No. 2—Ammonia ·880	1 ounce
Pot. bromide	180 grains
Water	40 ounces

Equal parts of this will give a four-grain pyrogallic solution, a strength which is a good average.

Warnerke's Sulphite Developer.

No. 1—Potassium carbonate ...	45 parts
Sodium sulphite	12 ,,
Water	1,000 ,,
No. 2—Pyrogallic acid	12 ,,
Sodium sulphite	24 ,,
Citric acid...	2 ,,
Water	1,000 ,,

For a normal development, equal proportions of No. 1 and No .2 are used.

Dr. Stolze's Potash Developer.

A. 25 parts of sulphite of soda dissolved in 100 parts of water.

B. 90 parts of pure carbonate of potash in 100 parts of water.

C. 10 parts of pyrogallol, 10 parts of alcohol, and 1 part of salicylic acid, in 100 parts of water.

Equal parts of solutions A and B are mixed together, and labelled—potash solution; solution C is labelled—pyro solution. In developing, 100 parts of water are mixed with 2 parts of the pyro solution, and from 1 to 3 parts of the potash solution.

Egli and Spiller's Hydoxylamine Developer.

"A.—Hydroxylamine hydrochlor.	32 grains
Citric acid	15 ,,
Potassium bromide ...	20 ,,
Water	1 ounce
"B.—Caustic soda	1 drm. (60 grs.)
Water	1 ounce

"To develop a 7½ by 5 plate, I take 1 drachm of A, 3½ ounces of water, and to begin with 40 drops of B; then, as the operation proceeds, another 20 or so are addded, *if necessary.*"

Cowan's Solution af Pyrogallic Acid Ready for Use.

Pyrogallic	1 ounce
Citric acid	60 grains
Water	109 ounces

Dissolve the citric acid in water, and add the pyro-

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gallic. The solution will contain 4 grains of pyrogallic to the ounce of water, and will keep good for months. For convenience, half the quantity of water may be used, when the strength will be 8 grains per ounce. In using it, dilute according to formula employed.

Abney's Method for Increasing the Sensitiveness of the Ferrous-Oxalate Developer.

Add 10 to 40 drops, according to requirement, of a 25-grain solution of hyposulphite to 3 ounces of developer.

Cowell's Clearing Solution.

Alum	2 parts
Citric acid	1 part
Water	10 parts

Edwards makes this sherry-coloured with perchloride of iron.

Eder's Method of Intensification.

The negative is whitened by soaking in saturated solution of mercuric chloride, and after thorough rinsing immersed in—

Potassium cyanide	10	parts
Potassium iodide	5	,,
Mercuric chloride	5	,,
Water	2,000	,,

As film becomes dark brown, the actinic opacity is increased; but prolonged action causes brown tint to become lighter, until at last the negative is no denser than at first.

To Intensify Gelatine Negatives with Silver.

After developing and fixing in the ordinary way, place negative in strong alum bath for an hour or two. Well wash. Pour on iodine solution of pale sherry colour. Well wash. Now take iron or pyrogallic intensifier, as for wet plate, and add silver according to requirement. When dense enough, place in fixing bath for a few minutes, and then well wash.

To Intensify Gelatine Negatives with Mercury (Ammonia Method).

Bichloride of mercury, saturated solution in cold water. (The negative should be placed in alum for a short time before treatment.) Well wash the negative, and immediately pour on mercury solution; do not keep it on too long unless the negative is very thin. Wash well, and immerse in bath of—

Water	10 ounces
Ammonia	10 drops

Leave plate in this solution until the black colour goes quite through the film. Well wash. If the mercury solution makes the negative too dense, dilute with water.

Scolik's Method of Mercurial Intensification.

The fixed and well-washed negative is allowed to remain in the following mercuric chloride bath until the film is thoroughly whitened :—

Mercuric chloride	1 part
Potassium bromide	1 ,,
Water	50 parts

The bleaching being complete, the mercuric solution is rinsed off, and the negative is immersed in a mixture of equal parts of saturated solution of sodium sulphite and water; the darkening action will be seen to take place steadily and slowly, just as when ammonia is used. Wash away the excess of sulphite.

Method for Quickly Drying Gelatine Negatives.

After well washing, place plate in a bath of methylated spirit for two or three minutes. Afterwards flow two or three times with common methylated sulphuric ether. The negative will dry in a current of air in two or three minutes.

To Prevent Frilling.

Soak plate before development in saturated solution of Epsom salts. Wash and develop as usual.

To Remove Yellow Colour from Gelatine Negatives.

After fixing, soak as long as necessary in a strong solution of alum. The plate may be left, if necessary, ten or twelve hours in alum solution.

COLLODION PROCESS.

For details and manipulations, *see* PROCESSES.

Substratum.

Whites of 2 eggs well beaten, 6 pints of water, and 1 drachm liquid ammonia.

Collodion.

Sulphuric acid	6 ounces
Nitric acid 1·450	4 ,,
Water	2 ,,

The temperature will rise to 170°. Wait till it cools down to 100°. Immerse dry cotton-wool (best carded and of long fibre). Be sure wool is dry. Draw it in long flakes, and pull it under acids with stout piece of glass. Do not crowd in too much. Take care each tuft is well wetted before putting in fresh tuft, carefully cover vessel, and put it where any slight fumes may escape. Leave for at least twelve hours—twenty hours will not spoil it. When ready, lift cotton out, and plunge in large quantity of water quickly, separating tufts with glass rods or bars of stout glass. Wash in changes of water till no acid is left. Wring cotton in coarse towel as dry as possible, and then pull out tufts, and place in the air to dry. Collodion made with this cotton will be very soluble, and will leave no sediment. Five to six grains will dissolve in one ounce of mixed ether and alcohol, and still the collodion will be very fluid.

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To Prepare one pint of Collodion with above.

No. 1.—	Alcohol	10 ounces
	Sulphuric ether	5 ,,
	Cotton as above	100 grains

To Iodise.

No. 2.—	Alcohol	5 ounces
	Iodide of ammonium ...	60 grains
	Iodide cadmium	30 ,,
	Bromide cadmium	20 ,,

Shake till dissolved, and then pour into No. 1.

Another plan, better for small quantities:—

Dissolve the iodides, as above, in 10 oz. of alcohol, then put in 100 grs. of cotton, and shake well. Lastly, add 10 oz. of ether, and shake till cotton is dissolved. This collodion will be ready for use in a few hours, but will improve with age.

Saturated Solution of Iron.

Fill a Winchester quart three parts full of crystals of protosulphate of iron, and add one ounce of sulphate of copper or zinc. Fill up with water, shake well repeatedly. Carefully cork bottle, and lay it gently on its side until next morning. Again shake, and the solution will be ready for use. Always keep full up to stopper with water. Always have the bottle half full of crystals. The use of the sulphate of copper or zinc is to prevent the formation of sediment of persulphate of iron.

Developer with above Solution.

Iron protosulphate (sat. sol. as above)	2 fluid ounces
Acetic acid	1 ounce
Water	20 ounces

Iron Developer for Negatives.

Protosulphate of iron (sat. sol.)	2 fluid ounces
Sulphate of copper	1 drachm
Nitrate of baryta	1 ounce
Glacial acetic acid	½ ,,
Water	20 ounces

When dissolved, filter out white deposit, and keep closely corked.

Henderson's Iron Developer.

Protosulphate of iron ...	20 grains
Glacial acetic acid	20 minims
Alum...	40 grains
Water	1 ounce

Nitrate of Iron Developer for Ferrotypes.

Protosulphate of iron ...	1½ ounce
Nitrate baryta	1½ ,,
Nitric acid	20 drops
Water	20 ounces

When dissolved, filter from dense white deposit of sulphate of baryta, and keep in closely-corked bottle. N.B.—It rapidly spoils when exposed to the air. Pictures by this process are of a very brilliant pearly white.

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Intensifying Solution for Wet-Plate Negatives.

No. 1.—Protosulphate of iron (sat. sol.)	2 ounces
Acetic acid	1 ounce
Citric acid	½ ,,
Water	20 ounces

Silver solution, as much as is necessary to make negative dense.

No. 2.—Pyrogallic acid	10 grains
Citric acid	25 ,,
Distilled water	2 ounces

Add a few drops of nitrate of silver solution, 10 grains per ounce.

Developer for very Delicate Transparencies.

Pyrogallic acid	3 grains
Citric acid	1 grain
Water	1 ounce

This development is slow, but the deposit is very fine. Tone with gold, 1 grain to 10 ounces of water.

PRINTING PROCESSES.

Sensitizing Bath for Albumenized Paper.

See information under PROCESSES, Silver Printing.

Durable Sensitized Paper.

Float the albumenized paper on a 10 per cent. solution of nitrate of silver for four minutes, draw it over the glass rod to drain, and then float the back of the sheet for a like period upon a bath composed of

Citrate of potash	1 part
Water	30 parts

Final wash in rain water. Sulpho-cyanide of gold toning suits best with this formula.

Werge's Gold Toning Bath.

No. 1.—Borax ... ... 1 ounce dissolved in hot water; when all dissolved, dilute to 80 ounces. Keep this in Winchester quart as stock solution. To tone, take for each grain of gold 8 ounces of above solution; mix. The bath is ready for work at once.

No. 2.—Chloride of gold	1 grain
Acetate of soda	20 grains
Water	8 ounces

Lime Toning Bath.

No. 3.—Chloride of gold	1 grain
Whiting	30 grains

Pour on eight ounces of boiling water, and stir. Now add one drop of saturated chloride of lime solution. When cool, bath is ready for use.

No. 4.—Chloride of gold	1 grain
Bicarbonate of soda	3 grains
Water	8 ounces

To be used at once.

No. 5.—Chloride of gold	1 grain
Phosphate of soda	30 grains
Water	8 ounces

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Collodion Enlargements—Croughton's Method.

Soak polished flatted crown glass in soda for some time. After well washing, immerse in weak sulphuric or hydrochloric acid, say one ounce to quart of water. Rinse well, and dry with clean cloth. Polish with wash-leather. Well wax polished side of glass with waxing solution made as follows:—

Yellow bees'-wax	1 drachm
Benzole	3 ounces

Use weak acid bath of nitrate of silver. Develop with iron as follows:—

Protosulphate of iron ...	6 drachms
Glacial acetic acid	2 ounces
Citric acid	60 to 80 grains
Sugar-candy	30 ,,
Water	20 ounces

Fix in hyposulphite 4 ounces to pint of water. Well wash. For transfer, use Autotype double transfer paper. Soak twenty minutes in cold water. Now place paper in hot water till surface feels slimy. Place face down on the wet collodion surface, and gently squeegee. When dry, the picture will come from glass.

Printing on Fabric.

Remove all dressing from fabric by boiling in water containing a little potash, dry, and albumenize with ammonium chloride 2 grammes, water 250 cubic centimetres, and the white of 2 eggs, all being well beaten together. A 70-grain silver bath is used, and the remaining operations are as for paper.

Winter's Canvas Enlargements.

Salting solution:—

Bromide of potassium ...	3 parts
Iodide of potassium	1 part
Bromide of cadmium... ...	1 ,,
Water	240 parts

German canvas is said to be better than English. This is immersed in the above, and when saturated, is drawn over glass rod and hung up to dry; it is then placed in a sensitizing bath made as follows:—

Nitrate of silver	4 parts
Citric acid	1 part
Water	140 parts

drawn over rod as before; when dry, is ready for exposure, which should be continued until outline of image is visible.

Developer.

Pyrogallic acid	10 parts
Citric acid	45 ,,
Water	410 ,,

This should be used at a temperature of 30° to 40° C., the canvas again immersed, and rocked to and fro until sufficiently out, washed freely, and fixed in the usual hypo solution; canvas being more permeable than paper, less after-washing is necessary.

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Collodio-Chloride Process.

For details, *see* PROCESSES.

16-gr. alcoholic sol. nit. sil., 1 oz. (by pounding silver salt with methylated spirit in a mortar).

Sulphuric ether	1 ounce
Pyroxyline	12 to 14 grains

When dissolved, add 1½ dr. 16-gr. alcoholic sol. chloride calcium; shake well, and keep carefully from light. A sizing of arrowroot should be applied to paper before pouring on collodio-chloride.

Cyanotype Printing (Blue Process).

For details and manipulations, *see* PROCESSES.

Water...	1 ounce
Red prussiate of potash (ferricyanide)	1 drachm
Ammonia citrate of iron ...	1 ,,

Prepare and preserve in the dark. Float the paper, and dry. Fixation by mere soaking in water.

The Pellet Process.

Gum	25 grammes
Common salt	3 ,,
Perchloride of iron ...	8 ,,
Tartaric acid	4 ,,
Water to make up to	100 cub. cents.

The coating should be on a highly sized and smooth paper, similar to good writing paper, as it should not sink in.

Develop with saturated solution of ferrocyanide of potassium.

Fix in a 10 per cent. aqueous solution of hydrochloric acid.

Carbon Tissue and Transfer Papers.

Make a jelly as follows:—

Nelson's transparent sheet gelatine	10 parts
White sugar	4 ,,
Water	25 ,,

Soak the gelatine in the water until soft, then gradually raise the temperature until the gelatine is dissolved, add the sugar, and well agitate. When set, turn the jelly out, and cut off the bottom portion so as to get rid of any grit that may have settled down, and the jelly is ready.

For a tissue giving a good photographic purple brown, take—

Vegetable black	72 grains
Alizarine lake	60 ,,
Indigo	13 ,,

Grind these with about four ounces of melted jelly, using muller and slab or cone paint mill, add to six pounds of the above-mentioned plain jelly, and mix well. The ready-ground water-colours sold in tubes may be used, but it is difficult to ensure making one tissue of definite composition. In ordinary cases one may estimate the tube colours to contain about half their weight of colour.

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Black tissue—

Jelly	2 pounds
Paris black pigment ...	50 grains

Red or Bartolozzi tissue—

Jelly	2 pounds
Venetian red...	3 ounces
Indian ink	8 grains

Transparency tissue—

Jelly	2 pounds
Indian ink	200 grains

The tissue compound being made, it is strained through muslin into a dish, this standing in a larger dish containing hot water.

The paper to be coated is now rolled up tightly face outwards, and the roll is laid upon the surface of the tissue compound, the loose end being gradually raised, when the surface of the paper will gather up a thin and even coat of pigmented gelatine. The length of paper being coated, it is placed over a stick and allowed to dry.

For making double transfer paper, take of—

Hard gelatine...	1 pound
Fine sulphate of baryta or permanent white	8 ounces
Water	5 pints

Mix these thoroughly, and stir into the mixture a solution of 50 grains of chrome alum in four ounces of water.

For a single transfer paper take—

Hard gelatine...	1 pound
Water	5 pints

When dissolved, add 300 grains of chrome alum dissolved in a pint of water; this will make the liquid somewhat thick and ropy, but sufficient acetic acid must be added to restore it to its original fluidity.

Paper is coated with either of these two compounds in the same way as with the tissue compound.

Sensitizing Bath for Carbon Tissue.

For manipulations and details of carbon process, *see* PROCESSES.

Bichromate of potash ...	1¼ ounce
Methylated spirit	4 ounces
Ammonia	1 drachm
Water	30 ounces

The ammonia helps to keep the tissue soluble. The spirit enables it to be dried at a higher temperature.

Burton's Method of Sensitizing Carbon from Back.

Bichromate Solution.

Water	20 ounces
Liquid ammonia	1 ounce
Bichromate of potash ...	4 ounces

Cut up tissue some time before use, and place under a weight to flatten. When ready for use, place face downward, and spread solution with a sponge, or, better still, a Blanchard brush. Take care it is uniformly wet, say for three minutes, and then pin up to dry. This method is very useful where large sheets are wanted.

Enlarged Paper Prints by the Powder Process.

Make an enlarged transparency, and varnish it; work up as much as necessary with lead pencil. Now take clean glass plate of the same size. Rub well with French chalk, slightly dust. Coat with plain collodion (iodized collodion will do if plain collodion is not ready to hand). When dry, coat with one of the sensitive mixtures for powder process given above. Dry perfectly over gas stove or spirit lamp in dark room. While still warm, print under the transparency, about three to ten minutes, according to light. The image will be faintly visible. Dust on, with large camel's hair brush, finely-powdered ivory black with a little Indian red or any other colour according to taste. When fully developed, cover with collodion, and place in dish with slightly acid water. When all the yellow is washed away, let the plate dry. To transfer, take a piece of Autotype double transfer paper, soak in warm water till slimy. Wet the plate, and apply paper. Squeegee, and let dry. If all has gone well, it should leave the glass readily. These prints are of course permanent.

Platinotype Process.

Expose the sensitized paper under a negative as usual; time about one-third for ordinary albumenized paper. Print may be examined in feeble light; a faint image will be visible. To develop, take a solution of potassic oxalate, and heat up to 170° to 180° in glazed iron dish. Potassic oxalate solution to be as follows:—

Potassic oxalate	130 grains
Water	1 ounce

Draw print face downwards slowly over the above hot solution, taking care to avoid air-bubbles. For over-exposed prints, lower the temperature of bath to 80°. For under-exposed prints, increase temperature to 190°. Great latitude of temperature is possible, according to requirements. After developing, the print is immersed in weak solution of hydrochloric acid as follows:—

Hydrochloric acid	1 ounce
Water	80 ounces

Prints to remain in acid bath ten minutes, and afterwards washed in three or four changes of water during half-an-hour.

VARNISHES.

Varnish for Wet Plate Negatives.

White hard varnish ...	½ pint
Methylated spirit (about)	1 pint

Try plate. If too thick, add more spirit. This will be found a capital varnish for retouching purposes.

Varnish for Dry Plates.

Red shellac varnish ...	½ pint
Methylated spirit (about)	1½ pints

Try a plate, and add or lessen spirit according to requirements.

Fritz Luckardt's Retouching Varnish.

Alcohol	300 parts
Sandarac	50 ,,
Camphor	5 ,,
Castor oil	10 ,,
Venetian turpentine	5 ,,

Varnish to Imitate Ground Glass.

Sandarac	18 parts
Mastic	4 ,,
Ether	200 ,,
Benzole	80 to 100 ,,

VARIOUS.

A Colour for Coating Machinery previous to Photographing.

Dry white lead	5 pounds
Lamp black	2 to 5 ounces
Gold size	1 pint
Turpentine	1½ pints

The amount of lamp-black is varied to suit machine or lighting. This paint is easily removed with turpentine.

Water-tight Solution for Wooden Dishes.

Common brown resin	½ pound
Bees'-wax	2 ounces

Melt together in tin pan (preserved-meat tin will do); when quite fluid, run solution rapidly all over where required. Wood must be perfectly dry.

Waterproof Glue for Wooden Dishes.

Soak ½ pound of best glue in cold water until quite soft, melt in glue kettle. When quite dissolved, pour in 1 ounce of hot saturated solution of bichromate of potash, and well stir. It is now ready for use; apply with brush. Put the article so treated to dry in full daylight for a day or two, and then apply strong alum solution. The vessel is now ready for use, but must be washed first.

To Clean Negatives Stained by Silver.

Take a plug of cotton-wool and well wet it with cyanide of potassium, rub gently all over the negative, using a little more force on the stained parts. Well wash. Dry on blotting-paper. If necessary to re-varnish, flood the plate once or twice with methylated spirit. Let dry, and then varnish in the ordinary way.

Mounting Solution for Scrap Books, &c.

Soak half-a-pound best glue in cold water till soft. Melt the glue in kettle or earthen jar standing in a saucepan. When quite thin, pour in gradually methylated spirit, stirring well between each addition until quite clear. Strain through coarse muslin into pickle bottles. Well cork, and store away for use. When wanted, stand bottle in hot water till glue is melted.

STANDARD FORMULÆ.

Adam-Salomon's Method of Reducing Over-printed Proofs.

Immerse for a short time in a solution made as below—

Cyanide of potassium ...	5 grains
Liquid ammonia	5 drops
Water	1 pint

Carefully watch the prints, and well wash afterwards.

Adam-Salomon's Encaustic Paste.

Pure virgin wax	500 parts
Gum elemi	10 ,,
Benzole	200 ,,
Essence of lavender	300 ,,
Oil of spike	15 ,,

Encaustic Paste.

Best white wax (cut in shreds)	1 ounce
Turpentine	5 ounces

Dissolve with gentle heat, and pour out in pomatum pot. If too hard when cold, add a little more turpentine.

To Fill Cracks in Varnished Negatives.

Take finely-powdered lamp-black, and rub gently, with circular motion, all over the negative. Use the finger or soft piece of wash-leather for the purpose. If properly done, the cracks will have completely disappeared.

To Give a Matt Surface to Prints on Albumenized Paper.

Mount the print in the ordinary way, but be careful to avoid any lumps. Well roll, and then sift on finely-ground pumice powder. Rub gently with palm of the hand, using circular motion. Examine from time to time. Continue operation until the proper surface is obtained.

Backing Plates to Prevent Halation.

A solution of bitumen in coal tar naphtha; or Brunswick black.

To Enamel Photographs.

Take a piece of glass of size required, free from scratches (plate-glass is best). Clean perfectly. When dry, rub over with French chalk. Well dust with brush. Coat with enamel collodion, as given above. When well set, place in dish of water. Soak prints to be enamelled in water. Afterwards place in *weak* solution of warm gelatine. Place print, face downwards, on collodionized plate, and squeegee. When dry, the print will readily strip from the glass.

England's Method of Enamelling.

Proceed as above, but omit gelatine. Take the print from cold water. Lay carefully upon collodionized glass, and squeegee. When dry, the print will easily leave the glass.

To Clean a Tarnished Daguerreotype.

Take a 3 per cent. solution of cyanide of potassium, and, after well washing silver plate, pour it on gently,

MEMORANDA.

and keep it in motion. Do not keep solution long on plate, but pour off and well wash. Should the tarnish still remain, pour on more of solution, and repeat operation till the plate is clean; finally, wash with distilled water, and dry over gas flame or spirit lamp, blowing on plate all the time to drive off the water evenly.

Blanchard's Formula for Powder Opalotypes.

Dextrine	4 drachms
Grape sugar	4 ,,
Bichromate of potash ...	4 ,,
Glycerine	2 drops
Water	12 ounces

Obernetter's Powder Process for Reproducing Negatives.

Dextrine	1 drachm
White sugar	1¼ ,,
Bichromate of ammonia ...	½ drachm
Water	3 ounces
Glycerine	3 or 4 drops

How to Print a Cracked Negative.

Either put printing frame at the bottom of a narrow box, 2 feet deep, with blackened sides, dropping a sheet of light tissue paper over the frame; or suspend from a roasting-jack a board upon which a printing frame can rest, the roasting-jack acting all the time of printing. No trace of crack should then be on the print.

Fol's Backing Sheets for Dry Plates.

Gelatine	1 part
Water	2 parts
Glycerine	1 part
Indian ink	a small addition

Make a paste, and coat strong paper or shirting; place the prepared material, face downwards, on waxed glass to set. Press to back of plate before putting into dark slide.

Faulkner's Plan to Colour a Background.

Rub wet chalks of proper tint on to the wet canvas background, and then soften down the effects with a clothes-brush.

To Glaze Albumenized Prints.

Clean a glass plate well, and rub over it a little powdered talc or wax dissolved in ether. Coat with normal collodion, and dry. Dip your prints in warm gelatine solution which has been filtered; run the same gelatine solution over the collodionized plate, and apply the warm and wet print face downwards. Then the card, dipped in warm water, is well pressed on with a piece of thin waterproof. A stout squeegee or scraper of glass is useful to press out air-bubbles.

NOTE.—A cubic centimetre is equal to a gramme of water.

TABLES

FOR THE CONVERSION OF GRAMMES (OR CUBIC CENTIMETRES) INTO OUNCES AND GRAINS.

CONVERSION OF GRAMMES INTO GRAINS.

Grammes	Grains
1	15·43
2	30·86
3	46·29
4	61·73
5	77·16
6	92·59
7	108·03
8	123·46
9	138·89

CONVERSION OF GRAINS INTO GRAMMES.

Grains	Grammes
1	·0648
2	·1296
3	·1944
4	·2592
5	·3240
6	·3888
7	·4536
8	·5184
9	·5832

CONVERSION OF GRAMMES INTO TROY OUNCES.

Grammes	Troy ounces
1	·03215
2	·06430
3	·09645
4	·12860
5	·16075
6	·19290
7	·22505
8	·25720
9	·28935

CONVERSION OF GRAMMES INTO AVOIRDUPOIS OUNCES.

Grammes	Avoirdupois ounces
1	·03527
2	·07054
3	·10581
4	·14108
5	·17635
6	·21162
7	·24689
8	·28216
9	·31743

The above tables render the conversion of the weights in question a matter of great ease, the error introduced in the last decimal place being trivial.

The use of the tables will be best illustrated by an example. Supposing that it is desired to find the equivalent in grains of 324·51 grammes, we proceed by breaking up this number into the following series of constituent parts, and finding the grain-equivalent of each part from the table.

Portions of original number	Equivalents in grains
300·00	4630·
20·00	308·6
4·00	61.73
·50	7·716
·01	·1524
	5008·1934

The required quantity is 5008·2 grains. The numbers taken from the table will, in most cases, require a change as regards the position of the decimal point; thus, to find the value of 300 grammes, one refers to the table, and finds 46·30 given as the equivalent, and a mere shifting of the decimal point two places towards the right multiplies this by 100, or gives the required number. In a similar manner, by shifting the decimal place of 30·86 one place to the right we obtain the value in grains of 20 grammes; while the number 61·7 is taken from the table without alteration as the equivalent of 4 grammes. For ·50 the table number must have its point shifted on to the left, making it 7·716 instead of 77·16; and finally, the value of ·01 is obtained by shifting the point of 15·43 two places to the left.

The above operations are, in actual practice, performed with considerable speed, the required equivalents being written down one after the other on a scrap of paper, and then added up.

DR. JANEWAY'S TABLE OF THE SOLUBILITY OF PHOTOGRAPHIC CHEMICALS.

MADE FOR THE SOCIETY OF AMATEUR PHOTOGRAPHERS OF NEW YORK.

Abbreviations.—s. soluble; ins. insoluble; sp. sparingly; m. moderately; v. very; alm. almost; dec. decomposed.

CHEMICALS.	WATER.		COLD ALCOHOL.
	59° F.	212° F.	
One part is soluble in	Parts.	Parts.	
Acid, Citric ...	0·75	·6	v. s.
Gallic...	100	3	m. s.
Oxalic	8	1	v. s.
Pyrogallic ...	3·5	v. s.	v. s.
Tannic	6	v. s.	v. s.
Alum ...	10·5	v. s.	ins.
Chrome	10	dec.	ins.
Ammonium, Nitrate	0·5	v. s.	v. s.
Chloride	3	v. s.	sp. s.
Carbonate ...	4	dec.	m. s.
Sulphocyanate	v. s.	v. s.	v. s.
Bromide	1·5	0·7	sp. s.
Iodide	1	0·5	m. s.
Baryta, Nitrate	8	3	
Cadmium, Bromide	v. s.	v. s.	m. s.
Iodide ...	v. s.	v. s.	v. s.
Copper, Acetate	15	5	sp. s.
Sulphate ...	2·6	0·5	ins.
Gold, Chloride	v. s.	v. s.	v. s.
Gold and Sodium Chloride	v. s.	v. s.	m. s.
Iron, Perchloride ...	v. s.	v. s.	v. s.
Protosulphate	1·8	0·3	ins.
and Ammonia sulphate ...	3	0·8	ins.
Iodide (Ferrous)	v. s.	v. s.	sp. s.
Iodine	7000		m. s.
Kaolin	ins.	ins.	ins.
Lead, Acetate	1·8	0·5	m. s.
Chloride	v. sp.	33	ins.
Nitrate	2	0·8	ins.
Lithium, Bromide ...	v. s.	v. s.	m. s.
Iodide	v. s.	v. s.	m. s.
Magnesia, Nitrate ...	v. s.	v. s.	m. s.
Mercury, Bichloride	16	2	v. s.
Cyanide...	12·8	3	ins.
Potassium, Acetate	0·4	v. s.	v. s.

CHEMICALS.	WATER.		COLD ALCOHOL.
	59° F.	212° F.	
One part is soluble in	Parts.	Parts.	
Potassium, Bicarbonate ...	3·2	dec.	ins.
Bichromate ...	10	1·5	ins.
Bromide	1·6	1	sp. s.
Carbonate	1	0·7	ins.
Cyanide	2	1	m. s.
Ferricyanide	3·8	2	ins.
Ferrocyanide	4	2	ins.
Nitrate	4	0·4	ins.
Iodide	0·8	0·5	m. s.
Oxalate	3	v. s.	ins.
Permanganate	20	3	ins.
Sulphate	9	4	ins.
Sulphite	4	5	sp. s.
Sulphuret	2	1	sp. s.
Silver, Nitrate	0·8	0·4	m. s.
Oxide	v. sp. s.	v. sp. s.	ins.
Sodium, Acetate ...	3	1	m. s.
Bromide ...	1·2	0·5	m. s.
Bicarbonate	12	dec.	ins.
Carbonate	1·6	0·25	ins.
Citrate	v. s.	v. s.	sp. s.
Hyposulphite	1	v. s.	ins.
Iodide	0·6	0·3	m. s.
Nitrate	1·3	0·6	sp. s.
Phosphate	6	2	ins.
Pyrophosphate ...	12	1·1	ins.
Sulphite ...	4	0·9	sp. s.
Sulphate ...	2·8	0·4	ins.
Tungstate...	4·0	2·0	ins.
Strontia, Chloride...	1·88	v. s.	sp. s.
Uranium, Nitrate ...	v. s.	v. s.	m. s.
Zinc, Iodide...	v. s.	v. s.	m. s.
Bromide	v. s.	v. s.	m. s.
Chloride	0·33	v. s.	v. s.

WEIGHTS AND MEASURES, AND THERMOMETER TABLE.

WEIGHTS AND MEASURES.

480·0 grains Troy = 1 oz. Troy.
437·5 grains Troy = 1 oz. Avoirdupois.
5760·0 grains Troy = 1 lb. Troy.
7000·0 grains Troy = 1 lb. Avoirdupois.

MEASURES OF LENGTH.

Millimetre = 0·03937 inch.
Centimetre = 0·39371 inch.
Decimetre = 3·93708 inch.
Metre = 39·37079 inch.

Inch = 2·5399 centimetres.
Foot = 3·0479 decimetres.

MEASURES OF SURFACE.

Square inch = 6·4513 square centimetres.
Square foot = 9·2899 square decimetres.

MEASURES OF CAPACITY.

Cubic centimetre = 0·0610 cubic inch.
Ditto, ditto = ·00176 pint.
Litre, or cubic decimetre = 61·0270 cubic inch, or 1·760 pint.

Cubic inch = 16·3861 cubic centimetres.
Gallon = 4·5434 litres.

MEASURES OF WEIGHT.

Milligramme = 0·0154 grains.
Centigramme = 0·1543 grains.
Decigram = 1·5432 grains.
Gramme = 15·4323 grains.
Kilogramme = 15432·3488 grains.

Grain = 0·0647 grammes.
Troy oz. = 31·1034 grammes.

THERMOMETER TABLE.

Comparison of Centigrade and Fahrenheit.

Cent.	Fah.	Cent.	Fah.	Cent.	Fah.	Cent.	Fah.	Cent.	Fah.
−17.7	0	7	44·6	31	87·8	55	131	78	172·4
−16	3·2	8	46·4	32	89·6	56	132·8	79	174·2
−15	5	9	48·2	33	91·4	57	134·6	80	176
−14	6·8	10	50	34	93·2	58	136·4	81	177·8
−13	8·6	11	51·8	35	95	59	138·2	82	179·6
−12	10·4	12	53·6	36	96·8	60	140	83	181·4
−11	12·2	13	55·4	37	98·6	61	141·8	84	183·2
−10	14	14	57·2	38	100·4	62	143·6	85	185
− 9	15·8	15	59	39	102·2	63	145·4	86	186·8
− 8	17·6	16	60·8	40	104	64	147·2	87	188·6
− 7	19·4	17	62·6	41	105·8	65	149	88	190·4
− 6	21·2	18	64·4	42	107·6	66	150·8	89	192·2
− 5	23	19	66·2	43	109·4	67	152·6	90	194
− 4	24·8	20	68	44	111·2	68	154·4	91	195·8
− 3	26·6	21	69·8	45	113	69	156·2	92	197·6
− 2	28·4	22	71·6	46	114·8	70	158	93	199·4
− 1	30·2	23	73·4	47	116·6	71	159·8	94	201·2
0	32	24	75·2	48	118·4	72	161·6	95	203
1	33·8	25	77	49	120·2	73	163·4	96	204·8
2	35·6	26	78·8	50	122	74	165·2	97	206·6
3	37·4	27	80·6	51	123·8	75	167	98	208·4
4	39·2	28	82·4	52	125·6	76	168·8	99	210·2
5	41	29	84·2	53	127·4	77	170·6	100	212
6	42·8	30	86	54	129·2				

SYMBOLS AND ATOMIC WEIGHTS OF THE ELEMENTS.*

Element.	Symbol.	Atomic Weight.	Observer.
Aluminium...	Al	27·26	Berzelius
Antimony	Sb	122·3	Kessler; Dexter
Arsenic	As	77·15	Kessler
Barium	Ba	137·16	Marignac
Bismuth	Bi	210·0	Dumas
Boron	Bo	11·04	Berzelius
Bromine	Br	79·95	Stas
Cadmium	Cd	112·04	Lenssen
Cæsium	Cs	133·00	Johnson and Allen; Bunsen
Calcium	Ca	40·00	Erdmann and Marchand
Carbon	C	12·00	Dumas and Stas; Liebig
Cerium	Ce	92·16	Rammelsberg; 91·34, Wolf
Chlorine	Cl	35·46	Stas
Chromium	Cr	52·08	Siewert
Cobalt	Co	58·74	Russell
Copper	Cu	63·12	Millon and Commaille
Didymium	D	94·96	Hermann
Erbium	E	112·6	Bahr and Bunsen
Fluorine	F	18·96	Luca; Louyet
Glucinum	Gl	9·30	Awdejew; Klatzo
Gold	Au	196·71	Berzelius
Hydrogen	H	1	Dulong and Berzelius
Indium	In	113·4	Winkler; Bunsen
Iodine	I	126·85	Stas
Iridium	Ir	196·87	Berzelius
Iron	Fe	56·00	Dumas
Lanthanum	La	92·88	Hermann; 90·18 Zschiesche
Lead	Pb	206·92	Stas
Lithium	Li	7·02	Stas
Magnesium	Mg	24·00	Dumas
Manganese	Mn	54·04	Schneider
Mercury	Hg	200·00	Erdmann and Marchand
Molybdenum	Mo	96·00	Dumas; Debray
Nickel	Ni	58·74	Russell
Niobium	Nb	94·0	Marignac
Nitrogen	N	14·04	Stas
Osmium	Os	199·03	Berzelius
Oxygen	O	16·00	
Palladium	Pd	106·57	Berzelius
Phosphorus...	P	31·00	Schrotter
Platinum	Pt	197·18	Andrews
Potassium	K	39·13	Stas
Rhodium	Rh	104·21	Berzelius
Rubidium	Rb	85·40	Bunsen; Piccard
Ruthenium...	Ru	104·40	Berzelius
Selenium	Se	79·46	Dumas
Silver	Ag	107·93	Stas
Silicon	Si	28·10	Dumas
Sodium	Na	23·04	Stas
Strontium	Sr	87·54	Marignac
Sulphur	S	32·07	Stas
Tantalum	Ta	182·30	Marignac
Tellurium	Te	128·06	v. Hauer
Thallium	Tl	203·64	Crookes
Thorium	Th	115·72	Delafontaine
Tin	Sn	118·10	Dumas
Titanium	Ti	50·00	Pierre
Tungsten	W	184·00	Schnieder; Dumas; Roscoe
Uranium	U	118·80	Ebelmen
Vanadium	V	51·35	Roscoe
Yttrium	Y	61·70	Bahr and Bunsen
Zinc	Zn	65·16	Axel Erdmann
Zirconium	Zr	89·60	Marignac

* From Thorpe's "Quantitative Analysis."

ELSDEN'S TABLE OF POISONS AND ANTIDOTES.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidote.
Vegetable Acids.	Oxalic Acid, including Potassium Oxalate	1 drachm is the smallest fatal dose known.	Hot burning sensation in throat and stomach; vomiting, cramps, and numbness.	Chalk, whiting, or magnesia suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies.	Ammonia Potash Soda	Vapour of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth, and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
Metallic Salts.	Mercuric Chloride	3 grains the smallest known fatal dose.	Acrid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
	Acetate of Lead	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	Cyanide of Potassium	*a*. Taken internally, 3 grs. fatal.	Insensibility, slow (gasping respiration, dilated pupils, and spasmodic closure of the jaws.	No certain remedy: cold affusion over the head and neck most efficacious.
		b. Applied to wounds and abrasures of the skin.	Smarting sensation.	Sulphate of iron should be applied immediately.
	Bichromate of Potassium	*a*. Taken internally.	Irritant pain in stomach, and vomiting.	Emetics and magnesia, or chalk.
		b. Applied to slight abrasions of the skin.	Produces troublesome sores and ulcers.	
	Nitrate of Silver		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids.	Nitric Acid	2 drachms have been fatal. Inhalation of the fumes has also been fatal.	Corrosion of windpipe, and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk, plaster of the apartment beaten up in water.
	Hydrochloric Acid	½ ounce has caused death.		
	Sulphuric Acid	1 drachm has been fatal.		
	Acetic Acid, concentrated, has as powerful an effect as the mineral acids.			
	Iodine	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrowroot, and starch given freely.
	Ether	When inhaled.	Effects similar to chloroform.	Cold affusion and artificial respiration.
	Pyrogallol	2 grains sufficient to kill a dog.	Resemble phosphorus poisoning.	No certain remedy, Speedy emetic

RATES OF POSTAGE, ETC.

Inland Letters.—To all parts of the Kingdom, for prepaid letters: Not exceeding 1 ounce, 1d.; exceeding 1 ounce, but not exceeding 2 ounces, 1½d.; and ½d. additional for every 2 ounces up to 12 ounces. A letter exceeding the weight of 12 ounces is liable to a postage of 1d. for every ounce, beginning with the first ounce. A letter posted unpaid is chargeable with double postage, and one posted insufficiently paid is chargeable with double the deficiency. No letter may be above 18in. long, 9in. wide, or 6in. deep, unless sent to or from a Government office. Inquiry for Missing Letters, &c., should be made at the Secretary's Office, New Buildings. The Returned Letter Office is in Telegraph Street, Moorgate Street. "Letters to be called for" can be obtained at the General Post Office, St. Martin's-le-Grand, and at the Charing Cross Post Office. No letters (except communications from the Savings Bank Department) are taken in "to be called for" at the other district or branch offices, and any so directed are sent to the Returned Letter Office.

Book Post.—The postage is ½d. for every 2 oz. or part thereof. A book-packet may be posted either without a cover or in a cover entirely open at both ends, so as to admit of the contents being easily withdrawn for examination, or it will be treated as a letter. For greater security of contents, however, it may be tied at the ends with string. No book-packet may be above 5 lbs. in weight, nor above 18in. in length, 9in. in width, or 6in. in depth, unless sent to or from one of the Government offices.

Registered Newspapers.—On each inland newspaper, posted singly or in a packet, the postage, when prepaid, is ½d.; but a packet containing two or more registered newspapers is not chargeable with a higher rate of postage than would be chargeable on a book packet of the same weight, viz., ½d. for every 2 oz. or part of that weight. A newspaper which has any letter or communication of the nature of a letter written in it or upon its cover is charged as an unpaid or insufficiently paid letter. Newspapers for abroad must be posted within eight days of publication, or book postage rates be paid.

Pattern and Sample Post.—Is restricted to bonâ-fide trade patterns or samples of merchandise. Goods sent for sale, or in execution of an order, or any articles sent by one private individual to another which are not actually patterns or samples, are not admissible, nor are those liable to Custom duties.

Inland Parcels Post.—Parcels may be transmitted by the Inland Parcels Post under the following general conditions:—The rate of postage, to be prepaid in ordinary postage stamps, is, for an Inland Postal Parcel of a weight not exc. 1 lb., 3d.; exc. 1 lb. and not exc. 3 lbs., 6d.; exc. 3 lbs. and not exc. 5 lbs., 9d.; exc. 5 lbs. and not exc. 7 lbs., 1s. The dimensions allowed on an Inland Postal Parcel are:—Maximum length, 3 ft. 6 ins; maximum length and girth combined, 6 ft.

Post Cards, bearing a halfpenny impressed stamp, available for transmission between places in the United kingdom only, in packets of twelve for 7d. and 8d. Foreign Post Cards, with an impressed stamp of 1d. and 1½d. each, are sold at that rate, and are transmissible to the majority of the countries of the Union.

Postal Orders, providing a cheap and easy way of sending small sums of money to any part of the kingdom, can be purchased at the following prices:—For orders of 1s. and 1s. 6d. a commission of ½d. is charged; 2s. 6d., 5s., and 7s. 6d., 1d.; 12s. 6d., 15s., 17s. 6d., and £1, 2d. The sender can order these to be cashed at any post office, but they must be presented for payment within three months of their issue.

Registered Letter Envelopes.—According to size, from 2½d. to 3d.

Money Orders are granted in the United Kingdom at the following rates:—For sums under 10s., 2d., 10s. and under £2, 3d. 1d. extra for every additional £1 up to £10.

Money Orders Payable Abroad.—Foreign orders are issued at the following rates: If payable in France, Switzerland, Belgium, Denmark, Germany, Holland, Italy, Egypt, Malta, Gibraltar, United States, Turkey, Cyprus, Valparaiso, Panama, and most of the British Possessions and Colonies:—On sums not exceeding £2, 9d.; £5, 1s. 6d.; £7, 2s. 3d.; £10, 3s.

Patents.—On application for provisional protection, £1; on filing complete specification, £3; or on filing complete specification with first application, £4. Before the end of four years from date of first application, a renewal fee of £50 must be paid, and before the end of the seventh year a fee of £100. The two fees last named may be paid by instalments.

Inland Telegrams.—The charge for telegrams throughout the United Kingdom is 1s. for the first twenty words, and 3d. for every additional five words or part of five words. The names and addresses of sender and receiver not counted. The charges for press telegrams are 1s. for every hundred words or portion of one hundred words handed in between six p.m. and nine a.m.; and 1s. for every seventy-five words or portion of seventy-five words handed in between nine a.m. and six p.m.; with an additional charge of 1d. per hundred or 2d. per seventy-five words, as the case may be, for every additional address.

The Chemical Corner.

WITH a slight knowledge of chemistry, the photographer may test most of the photographic bodies with which he has to deal.

A corner of his work-room will serve for laboratory, and the following apparatus will suffice for work. Test-tubes and stand, tube cleaner, spirit lamp, retort stand, wash bottle, small evaporating basin, glass funnel, beakers, burette and stand, weights and balance, pipette, filter paper, four inches of platinum wire for heating substances in flame, sulphuretted hydrogen generator, watch glasses, glass rod and glass tubing, triangular file; many of these the photographer has already.

All unknown substances whose nature is to be ascertained should be dissolved in water, or else brought to that soluble condition, generally by the help of some acid. A small portion of the solution, which is divided into three or four parts, is taken, diluted with water, and treated with a few drops of one or other reagent. These last ought also to be in the form of aqueous solutions. The acid or alkaline character of the solution, the odour, flavour, and density of the body to be examined, are important indications, observations of which must not be neglected.

Potassium Salts.—Carbonate of potash, with an acid, causes a violent disengagement of carbonic acid, and in a solution of nitrate of silver a pale yellow precipitate of carbonate of silver, without giving off carbonic acid.

Potassium salts dissolved in water form a yellow precipitate with bichloride of platinum. They colour an alcohol flame lavender.

Sodium Salts give an intense yellow colour to an alcohol flame. They are very soluble, and precipitate white with potassium antimoniate.

Hyposulphite (or, rather, thio-sulphate of soda). As a delicate test, soak card or paper to be examined in distilled water, and see if liquid will bleach iodide of starch. The latter is prepared by tinting thin starch a very faint blue with a solution of iodine in alcohol.

Chloride of sodium. It decrepitates on the fire. Insoluble in pure alcohol.

Phosphate of soda is soluble in four times its bulk of water; forms with nitrate of silver a yellow precipitate, soluble in nitric acid.

Acetate of soda, when heated, gives off a strong odour of vinegar.

Ammoniacal Salts.—Fixed alkalies—such as potash, or soda—evolve, even when cold, a gas which turns red litmus paper blue.

Barium salts colour a lamp flame green, and form yellow precipitates with chromate of potash.

Calcium salts (lime) form, with oxalate of ammonia, an insoluble white precipitate, insoluble in acetic acid.

Magnesium salts give, with phosphate of soda and ammonia, or with carbonate of potash or soda, white precipitates.

Iron Salts.—A. The ferrous salts in solution are of a bluish-green colour. Their taste is sweet, afterwards astringent, resembling that of ink. They form a blue precipitate by the ferricyanide of potassium (red prussiate).

B. The ferric salts are reddish yellow in solution, rough, and astringent. They form a deep blue precipitate with ferrocyanide of potassium (yellow prussiate), and red with sulphocyanide.

Silver Salts.—The chloride becomes violet in the light, and may be dissolved in ammonia or cyanide of potassium.

The bromide turns greenish yellow in the light, and is less soluble in ammonia

The iodide is of a pale yellow colour, practically insoluble in ammonia.

These three insoluble salts may be reduced to metallic silver in the presence of hydrochloric or sulphuric acid, and zinc or iron.

Nitrate of silver in solution gives a white precipitate on addition of hydrochloric acid.

Salts of Mercury.—Bichloride of mercury gives, with iodide of potassium, a red precipitate, highly soluble in an excess of iodide.

Salts of Gold.—Chloride of gold forms a purple precipitate is solutions of chloride of tin; also with sulphate of iron.

Salts of Copper.—Salts of copper strike a deep blue colour with ammonia and give a chestnut brown precipitate with ferrocyanide of potassium (yellow, prussiate).

Having found the metal* or base, the next experiment is to determine what the acid is. Warm about ten grains of the substance with strong sulphuric acid in a test-tube.

Effervescence with inodorous gas indicates the presence of *carbonic acid;* confirm the experiment by passing the gas into lime-water: white precipitate.

Effervescence with pungent fumes, which form white clouds when brought near the stopper of the ammonia bottle, shows the presence of *hydrochloric acid.*

Yellow fumes which explode when heated strongly indicate *chloric acid.*

Brown fumes indicate *hydrobromic acid,* but slight brown fumes, which increase when metallic copper is placed on the liquid, indicate *nitric acid.*

Violet fumes prove the presence of *hydriodic acid.*

Yellow fumes, which bleach moist litmus paper, indicate *hypochlorous acid.*

Effervescence, with odour of burning sulphur, indicates *sulphurous acid.*

Odour of burning sulphur and yellow precipitate indicate *hyposulphurous acid.*

Effervescence, with inflammable gas which burns with a blue flame, indicates the probable presence of *oxalic acid.*

Gradual blackening, with evolution of inflammable gas, proves the probable presence of *citric acid.*

Odour of vinegar indicates *acetic acid.*

To confirm some of the preceding tests, dissolve about twenty grains of the substance in water; to a small part of the solution add barium nitrate. A white precipitate, insoluble in nitric acid, indicates *sulphuric acid;* yellow, soluble in nitric acid, indicates *chromic acid.*

To another part of the solution add silver nitrate. A white precipitate, insoluble in nitric acid, indicates *hydrochloric acid;* yellow, insoluble in ammonia, proves the presence of *hydriodic acid;* cream-coloured, slightly soluble in ammonia, indicates *hydrobromic acid.*

A white precipitate, nearly insoluble in cold nitric acid, but soluble on boiling, indicates *hydrocyanic acid.*

A white precipitate, which quickly blackens on standing, indicates *hyposulphurous acid.*

To a small part of the solution add sulphate of iron, and then gradually pour down the sides of the tube strong sulphuric acid. A brown ring at the junction of the two liquids indicates *nitric acid;* a light blue precipitate with sulphate of iron indicates *ferrocyanic acid;* a dark blue precipitate proves the presence of *ferricyanic acid.*

To another part of the original solution add acetic acid, acetate of ammonia, and calcium chloride. A white precipitate, soluble in hydrochloric acid, indicates *oxalic acid.*

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* Of course, in the case of gallic, pyrogallic, and citric acids, no metal is present.

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